The Builder.

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The Building and Decoration of a Royal Chapel.

THE "Royal and Collegiate Chapel of Our Lady and St. Stephen within our Palace at Westminster" is so frequently referred to in documents dating from the reign of Edward I. to that of Edward VI., that all who are interested in Mediæval architecture must feel some desire to know what kind of structure it was which received so much care and attention at the hands of so many of our English kings. Fortunately, the documentary evidence concerning the building and decoration of this chapel is very voluminous and interesting. In the Public Record Office, under the "Q. R. Rolls Ancient Miscellanea," bundles 870 to 873, will be found a number of accounts dating from the nineteenth year of Edward I. to the thirty-fifth of Edward III., including the rolls of Robert de Hillum* and Walter de Weston. These rolls are the accounts for work done in connexion with St. Stephen's Chapel, Westminster, and the Palace within the Tower of London. They are, for the most part, fragmentary, and do not appear to include the whole series which has been referred to by Smith, Topham, and Brayley; but the mass of evidence, taken together, is highly interesting, as it not only gives a great insight into the manner in which this most remarkable edifice was erected, but also shows what wages were earned by the various craftsmen in the thirteenth and fourteenth centuries, and perhaps, what is even more remarkable, preserves the names of English painters whose very existence seems to have escaped observation. These documents will for the most part be found published and translated in Smith's "History of Westminster," 1807; Brayley's "Ancient Palace of Westminster," 1836; "an Account of St. Stephen's Chapel" published by the Society of Antiquaries in 1795, and an additional series of plates and descriptions published by the same society in 1805. There are also documents relating to the establishment of the collegiate foundation given at length in "Dodsworth's and Dugdale's Monasticon," 1655. Now although this mass of evidence and material is very extensive, yet it is by no means easy to piece it together, and draw from it correct deductions as to exactly what was done by these various sovereigns; but we shall attempt, by comparing the various accounts to which we have referred, to get at something like a connected narrative of the works executed at St. Stephen's Chapel during the thirteenth and fourteenth centuries.

There can be no doubt that St. Edward the Confessor erected a chapel or oratory of some kind within his palace at Westminster, and this seems to have been rebuilt by King Stephen, who either re-dedicated it to his patron saint, or added his name to that of the original dedication. During the reign of Edward I., however, the building was injured by fire, and in the year 1292, King Edward I. commenced either the rebuilding or restoration. Now all the three modern works to which we have previously alluded are in thorough disagreement. Smith says "that Edward I. simply restored and decorated King Stephen's Chapel;" but Sir John Englefield and other writers, in the publications of the Society of Antiquaries, give it as their opinion that Edward I. entirely rebuilt the chapel, which was again injured by fire in 1298, and was not restored until the time of Edward III. Brayley, however, takes another view; he says that Edward I. rebuilt the church entirely, but that the work was completely destroyed by the fire in 1298, and that its rebuilding was commenced by Edward II., and in support of his view he quotes a roll which he says distinctly relates to the foundation of the chapel being laid in the year 1292, and a number of most interesting documents, which prove beyond doubt that Edward I. was carrying out important works in connexion with the chapel. But there is this very great difficulty about the matter; if Edward I. commenced building the chapel, as the document informs us, "in the month of April in the twentieth year of his reign (1292)," how is it that we find that on November 10 of the same year, the painters and decorators were called in? Surely in the space of seven months the chapel could not have advanced far enough for its walls to be painted.

The roll to which Brayley refers is entitled "Michaelis de Cantuaria," and is in bundle 870 under the nineteenth year of the reign of Edward I., and is referred to as "Primus Rotulus de Operationibus primo factis pro Capella Beati Stephani in Palatio Westmonasterio," and also as "Rotulus de Misis et Expensis factis Circa Fundamentum Capellæ Regis in suo Palatio apud Westmonasterium per Manus Magistri Michaelis de Cantuaria Cementarij. . . . Vicesimo Octavo de Mensis Aprilis anno Regni Regis Edwardi, filij Regis Henrici." There can be no doubt whatever, from the wording of this roll, that Edward I. commenced the entire rebuilding of the chapel in the nineteenth or twentieth year of his reign, that is 1292, and we can only suppose that the painters were employed upon some adjunct to the chapel—possibly the "Oratory of Our Lady of the Pew," which had been previously rebuilt. The series of accounts relating to the reign of Edward I. are given at considerable length by Smith, and they extend from the nineteenth to the twenty-second year of that King's reign. From them we learn that Master Michael, the *aparator* or foreman, was paid 3s. 6d. a week, that other masons were paid for five days, 2s. 1d. each; but that some, for five days, received only 1s. 8d. each. Jacob Lenesham, the chief smith, had 3s.; the carpenters seem to have received about 5½d. each. Of the painters employed, Master Walter, who seems to have been the principal of them, received 7s. a week, but John of Soningdon, Roger of Winchester, and Roger of Carlysle, received 2s. 6d. each, whereas Thomas, son of the master (*i.e.*, Master Walter); William of Ross, William of Oxford, Matthew of Worcester, Godfrey of Norfolk, received each 1s. 10½d. for five days. There were, however, two Italians, Andrea and Giletto, who received 8s. for six days, so it is evident that the foreigner did not undersell the Englishman in those times. A very interesting thing about this painting is that it was executed with oil, as we find over and over again charges for "one pottle of oil, 5d.," also varnish, "1 lb., 3½d."; 8 lb. of white lead, 1s. 2d." Four hundred of gold

* Or Hill.

(evidently gold leaf) is charged 13s. 4d. Four hundred of silver, 2s.

Smith says that "the chapel, as thus rebuilt and decorated by Edward I., seems to have remained until the beginning of the reign of Edward III., who, with a view of rendering it more splendid, rather than because it required repair, pulled it down and erected it upon a much larger scale." Although he is borne out in this statement by Stowe and others, yet it does not appear to be correct. We know from Matthew of Westminster that in the year 1298 a great fire broke out in the smaller hall at the Palace of Westminster, which destroyed the palace and part of the Abbey, and, in the charter given by Edward III. for the foundation of a college of priests attached to St. Stephen's chapel, he says: "Capellam quandam spatiosam, in pallatio nostro apud Westmonasterium situatam, in honorem beati Stephani prothomatiris, per progenitores nostros nobiliter inchoatem, nostris sumptibus, regüs, fecimus consummari." ("Flores Historiarum Londini," 1570, p. 411.) From this it is quite evident that Edward I., who was, of course, included in "progenitores nostros," did *not complete* the chapel, also, that Edward III. did *not entirely rebuild* it, but "caused it to be *completed*, at our expense." There is also another matter which must be taken into consideration, viz., that, from the rolls existing at the Record Office, we find work was being carried out at the chapel from the first to the seventh year of Edward II., and in the last year of that King's reign, charges are made for cutting timber in the forest of Tonbridge, "pro Capella Regis Westm." In the fourth year of Edward III., the works of the chapel were evidently resumed on a very large and important scale, as we see from the roll of Robert de Hill.

Now, we suggest that the whole of these difficulties can be explained by a reference to the chapel itself. Of course, it was to a great extent destroyed by the fire in 1834, but the crypt escaped, though in a very mutilated condition.* One thing, however, could be seen in connexion with it, and that was that the work was of two distinct dates. The great solid piers supporting the vaulting looked like Edward I.'s work (1292), but the vaulting which they support has lierne ribs, and the tracery of the windows ogee cusping. We are inclined to think that these latter features date from the reign of Edward II., and are the works referred to as being executed by that monarch. In the last year of Edward II.'s reign, as we have previously pointed out, timber was being cut for the chapel in the forest of Tonbridge, and if we turn to the roll of Robert de Hill, we shall find that this timber was used for the scaffolding for erecting the upper chapel.

But before considering this point, we must take notice of the first mention which we find in the rolls of Edward III.'s operations at St. Stephens. "Fourth year of the reign of Edward III. (1330), May 27. To Master Thomas, the mason, coming first to Westminster, and beginning there upon the New Chapel of St. Stephen, 'et intrasura super moldas operanti,' for his wages for six days, by order of the lord treasurer and council, 6s." Probably we may regard Master Thomas, or, as he is sometimes called, "Master Thomas of Canterbury," as the architect, and, throughout all the accounts in which his name is mentioned, we find that he received 1s. a day wages. "Intrasura super moldas operanti" is supposed to mean working upon the models in the Treasury. On June 5, 400 stones from Caen are bought at 4*l.* per 100, and 300 stones, called "quoins" or "coyns." July 15, "To Robert Leclerk and three scaffold-makers, for erecting a scaffold at the east end of the chapel," &c., for five days at 3½d. a day, 4s. 4½d. It is certainly strange to read that a scaffold-maker was paid more than a quarter the allowance of an architect! On the same day, we find the following entries:—"To six masons for five days, at 5½d. per day, 13s. 9d. To Walter Penny, marble merchant, for six days, at 5½d. per day, 2s. 9d." On July 23, we find more scaffold makers employed and more marble masons, and very extensive scaffold works being erected at the east end of the chapel. From the fact that the workmen and the scaffolding make their appearance at the same time, it is quite evident that the upper chapel is in progress, and it should be noted that we find no charges here, as we do in the accounts of Edward I.'s time, for work on foundations. Marble masons being mentioned, proves also that the work was for the upper chapel, as no marble was used for the crypt.

The principal work for this year seems to have been on the east gable end, but, on April 27, 1331, we find twenty-three large Reigate stones for the "form pieces" for the windows, and, on June 15, 1331, "fifteen pieces of Reigate stone for "mold pieces" for the upper windows,* nineteen pieces of Reigate stone for the sides of the chapel; July 6, fourteen pieces of stone called "form pieces" for the windows; and, on July 20, "one hundredweight of lime for the great window of east gable," and so the accounts run on to 1341. From the fifth to the fourteenth year of Edward III., Walter de Weston was clerk of the works, and at the Record Office his account is still preserved. By the 17th of Edward III. the work seems to have progressed considerably, as we find charges for covering up the tabernacles with boards. By the 21st of Edward III., 1347, we find the carpenters were at work upon the ceiling, and the accounts of this are very interesting because they set at rest a question which has been very much disputed amongst antiquaries, some insisting that St. Stephen's had a stone vault. Mr. Lee, in an imaginary restoration of the chapel made about 70 years back, represents it with an open timber roof of impossible construction.† But let us see what the accounts tell us. On May 19, 1347, we find John Fulbourn, Thomas Seli, with eighteen other carpenters working on the "Vesura."‡ On October 16 there are sixteen carpenters working *super stapulationem vossuræ*. (Smith and Brayley both give this word as "stapulationem," which really has no meaning at all, but we believe the word to be a mistake for "scalpulationem," which would make the sentence read in English "working upon the carving of the vaulting.") On October 27 there are twenty-three carpenters working upon the *vosura*, and two carpenters' apprentices, carving "bosses," also large sums of money expended upon "fish sounds for making glue" for the carpenters. Now, there can be no doubt from this that the roof was a wooden barrel-vault, but it appears to have had bosses and ribs, because in the 19th of Edward III. we find "29 courbes for strengthening the arches and keystones of the *vensura* (vosura)." Although it was evidently a ribbed vault, it could not have possessed groins or cross vaults, as all the existing drawings show a cornice over the windows, surmounted by a pierced parapet which was unbroken from end to end, and there were neither vaulting shafts nor springers of any kind. In the twenty-fifth year of Edward III., 1351, we find William Padryngton at work upon the statues for the chapel. We read as follows:—"To William Padrington for one large stone bought at Dunstable 10s. For two stones to make images of sergeants at arms, 10s. For two images made for the chapel by agreement . . . . to receive by task work for each 4 marks 5*l.* 6s. 8d." "For making twenty angels to stand in the tabernacles, 6s. 8d. for each image." "For making a certain image called John le Wayte of stone found by himself, by taskwork, 1*l.* 6s. 8d." "For making three kings to stand in the tabernacles of the chapel, of the king's stone by task work 2*l.* 13s. 4d. for each image; 8*l.*" The tabernacles mentioned in these accounts are the great niches between the windows, which had two rows of statues within them. The upper tier consisting of small angels and the lower of large statues of kings. We also find that on November 14, 1351, a certain "Lodge" was new made for making the stalls for the chapel, and we find accounts for "two sawyers sawing timber for the stalls five days, 5d. per day each." To Richard Wilton "apparil" or foreman, working on the stalls six days, for his weekly wages 3s. 6d." "Five carpenters at 6d. each per day." "1,000 great spikyng"* for "the planks of the stalls." There are a number of other accounts, such as sawing timber for the finials of stalls, &c.

And now comes a question which has puzzled all writers upon St. Stephen's Chapel, and it is this,—Where were the stalls placed? It is quite evident that they could not have stood against the walls of the chapel, because the great double basement table, surmounted by the beautiful wall arcading which is so magnificent a feature of the interior of this chapel, passed completely round the building, except where broken by the doorways. We think there can be little doubt that the stalls stood some 5 ft. or 6 ft. away from the walls, leaving a passage clear on either side, and that they were backed up by stone screens, as we see in the Cathedral of Alby, and many other churches in the south of France and in Spain.

We know also for certain that there was a rood-screen in the chapel, because it is mentioned in the will of Henry VI., who leaves instructions that the rood-screen and stalls of Eton Chapel should be made in the same manner and form as those in St. Stephen's Chapel (see letter by John Cranch in Smith's work).

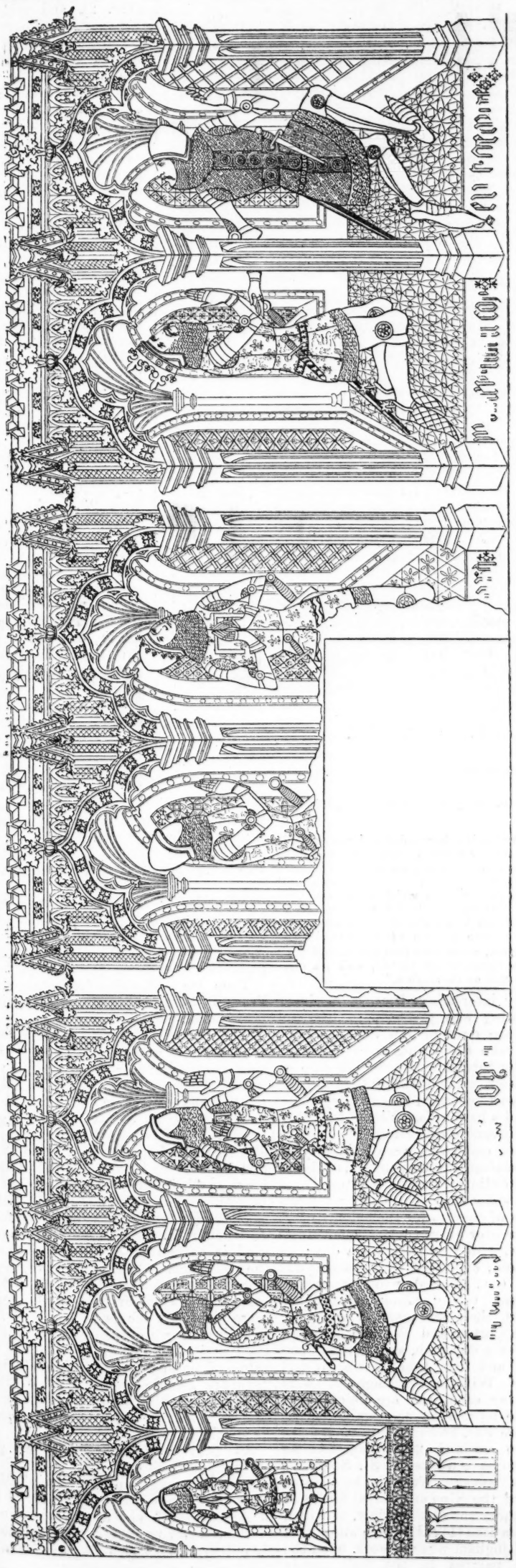
Here is a curious entry from the roll of Walter de Weston: "Several pieces of Caen stone wrought for the columns and *corall* of the said chapel, which lie in the east end of the chapel." In Du Cange's Glossary, the word "Corallum" signifies the "inner part of anything which is enclosed within something else,—the intestines, for instance,—or a space enclosed within another." This seems to point to the fact that the Ritual choir of St. Stephen's was enclosed within screens, standing free of the walls all round, and several of the accounts go to strengthen this view. Thus: "To John Brothers for one shipload of chalk for the repair of the wall behind the stalls." "To Master Edmund Canon,—master stonecutter, working on the stalls * * * 364 days, at 1s. 6d. per day, from the 5th day of June,—31st Edward III." Now, as Edmund Canon is mentioned as "master stonecutter," there can be no doubt that his work was executed in that material, and we would call attention to the very high wages which he received, 1s. 6d. per day, half as much again as the architect, so that, undoubtedly these stone screens, which are sometimes referred to as "rere-doses," were of an extremely elaborate nature.† The only charge that we can find in the accounts which could refer to the rood-screen is as follows:—"26th Edward III., four pairs of capitals and basses bought for the ambos of the chapel." The word "ambos" is certainly not used here to signify a pulpit. This rood-screen must have had two altars against it, because William Prestwick directs by his will that mass should be said for him "at one of the two altars in the nave of the chapel."

With regard to the suggested treatment of the choir at St. Stephen's, it should be pointed out that the chapel was very wide,—32 ft. from wall to wall,—and that the substructure of the crypt was sufficiently solid to support the superimposed weight of stalls, screens, &c. The responds in the eastern portions of the crypt had a most unusual amount of projection,—nearly 6 ft. from the wall; and there was no corresponding projection of any kind in the upper chapel. The vaulting is also very ponderous, as if constructed for the purpose of supporting a great weight; whereas, if the choir had not been arranged

* This crypt has since been restored, and now serves as a chapel for the House of Commons.

* "Form pieces" we take to mean tracery, and "mould pieces," the arches and jambs of the windows.
† See his drawings in the Architectural Museum.
‡ This word is spelt in various ways,—"vossura," "vesura," "vousura," &c. It means vaulting.

* Probably long nails or pegs.
† Probably Edmund Canon also designed these screens, which would account for the high wages he received.



[*See next page.*

Fig. 1.—Portraits of the Princes of the Family of Edward III. on East Wall of St. Stephen's Chapel, Westminster.

as suggested, there would have been absolutely nothing to support, except the floor of the chapel, which might, as is the case at Ely Chapel, Holborn, have been supported upon beams of timber. Another doubtful point is the tracery of the windows. Although this was in existence when Hollar made his views (which, by the way, are very inaccurate), yet, when Wren restored the building as shown in the views given by Maitland, Malcolm, and others, every vestige of tracery had disappeared. With every respect for Sir Christopher Wren, it would be difficult to conceive anything much more hideous than the interior of St. Stephen's Chapel, as arranged by him for the use of the House of Commons. A flat plaster ceiling cut the building at the springing of the window arches. The windows themselves were blocked up, and square holes quite devoid of design, fitted with great sashes, were substituted. The great east window was also blocked up, and round-headed lights substituted. The western portion of the chapel was converted into a lobby, with rooms above it. Every portion of the ancient work was most carefully excluded from view by lath and plaster partitions, brick work, boarding, and panelling. In fact, it was not until the year 1790, when it became necessary to remove some of Wren's additions, that the elaborate and exquisite work concealed behind them was known to exist. This discovery led to the publication of Smith's work, and Carter's drawings. The whole arrangement of the walls and magnificent arcades of the chapel was brought to light, but Wren had so carefully destroyed every vestige of the window tracery, that not a particle of it was discovered either then or at a subsequent period, and all we can tell is that the side windows were divided by mullions into four lights, that these mullions were adorned with shafts, and that the lights were blocked about one-third of their height, the space so blocked being adorned by a series of wall-painting, remains of which are still preserved in the British Museum, and that the head of the great east window was trefoil in shape, though enclosed within a sharp-pointed arch internally.

It will be seen from this statement that the tracery of the windows shown in the drawing (see lithograph) is conjectural, and it is, perhaps, right to explain why it is treated in such a different manner to that shown by Mr. Billings in his drawings for Britton & Brayley's "Palace of Westminster" and Mr. Lee's restoration at the Architectural Museum. We know, fortunately, from the accounts contained in the roll of Robert de Hill, that these windows were commenced in 1331. Now Mr. Billings shows purely geometric tracery founded upon the east window at Merton Chapel; but the choir of Merton was certainly completed before the year 1277, whereas the windows at St. Stephen's were not commenced until the year 1331; so that in restoring these windows we should study contemporary work,—the Lady Chapel at Ely, for instance (1321 to 1349), the octagon and later portion of the choir of the same cathedral (1322 to 1373), or the additions made to the cloisters of Westminster Abbey in the time of Edward III.,—and we shall see, if we do so, that the tracery must have been curvilinear, and not geometrical; in addition to which, the beautiful little parapets and canopies which adorned the walls of the chapel were all curvilinear. Some fragments of these are preserved at the British Museum and at the Architectural Museum in Tufton-street. Sprandrels of the windows did, it is true, to a certain extent partake of a geometrical character. Probably, however, this was merely done to ensure a look of repose and quietness in this part of the building, which could not have been obtained if the space had been filled in with curvilinear traceries. The magnificent canopies between the windows, and the beautiful series of canopied niches forming the wall arcade, remind one strongly of similar features in the Lady Chapel at Ely. In 1351 the stained glass was commenced. The principal artists

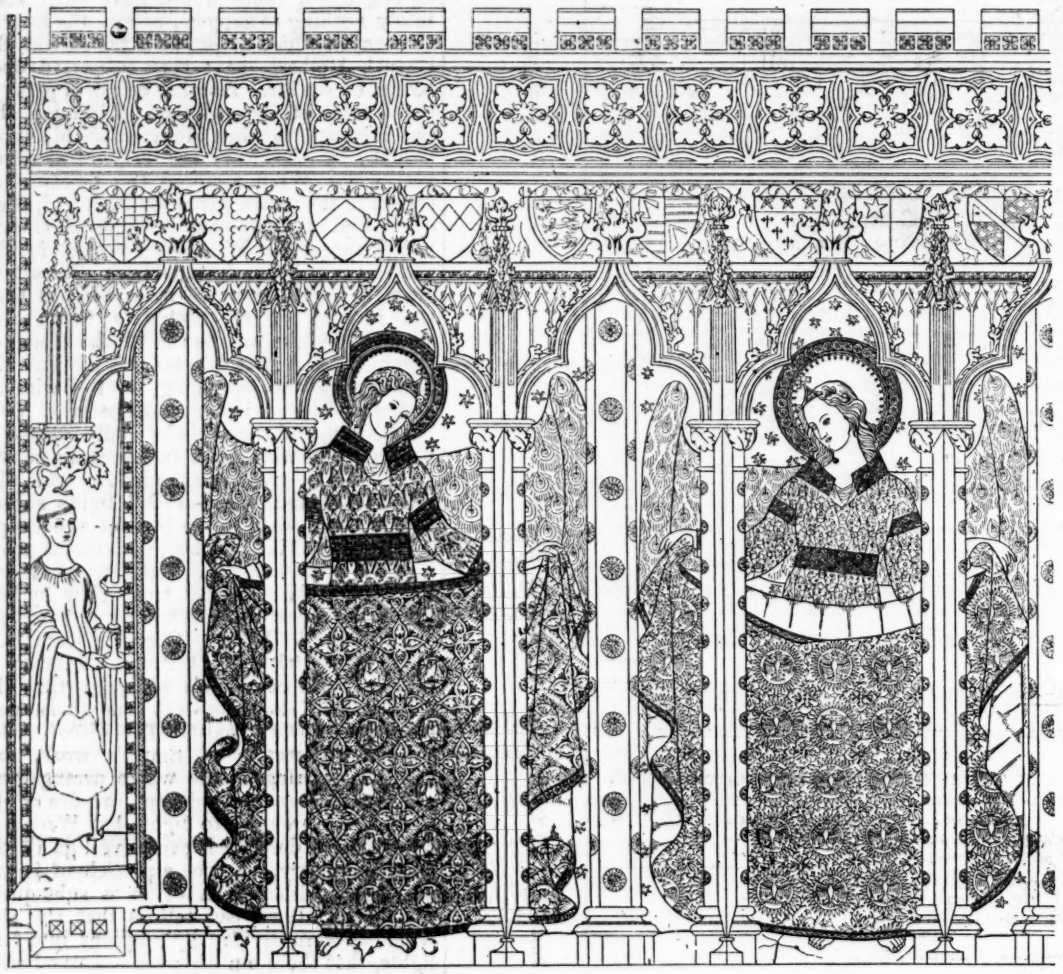


Fig. 2.—Decorations of Wall Arcade, St. Stephen's Chapel.

appear to have been Master John de Chester, whose wages were 7s. a week, and John Athelard, John Lincoln, Simon Lenne, John Lenton, and Goodman de Lenton, each of whom received 1s. a day. It is distinctly stated in the accounts that they were employed in "drawing images for the windows." The other workmen employed received from 7d. to 4d. a day. Some fragments of this glass were discovered in Smith's time, and are represented in his work.

The magnificent Chapel of St. Stephen at Westminster, notwithstanding its superb carving, marble shafts, and stained-glass windows, did not completely satisfy the religious sentiments and artistic aspirations of the age, for in addition to all these architectural embellishments, a complete scheme of decorative painting was carried out over the whole building. A good deal of the work consisted of ornamental borders, patterns, and rosettes raised in stucco, which are spoken of as "pryntes." Not only were these ornaments placed on the stonework, but even upon the marble shafts. They are of a similar nature to what the Italians call "gesso," but whether of the same material it is difficult to say, as this is not stated in any of the accounts. There can be no doubt whatever that the paintings executed for St. Stephen's Chapel were carried out in oil, as we find such entries as the following over and over again:—"For nineteen flagons of *painters' oil*, at 3s. 4d. per flagon, 3*l.* 3s. 4d." "For 19 lbs. of white-lead, at 4d. per lb., 6s. 4d." "For 62 lbs. of red-lead, at 5d. per lb., 1*l.* 5s. 10d." "For 6½ lbs. of white varnish, at 9d. per lb., 4s. 10½d." "For 18 lbs. of red varnish, 4d. per lb., 6s." Whether the oil and varnish were mixed with the colours, or used only in the priming and as a glaze over the painting, it is, of course, impossible to say, but a letter published by Smith from Mr. J. Haslam, chemist and apothecary to Bridewell and Bethlehem Hospitals, who analysed the colours used in the decorations at St. Stephen's Chapel, seems to show that the colours were actually mixed with oil, because he says:—

"In order to examine these colours, I was obliged, after having carefully scraped them from the stone, to employ a quantity of impure æther to dissolve the varnish which had been laid over them, and also to separate *the oil with which the colours had been prepared*. By this method I was enabled to procure the colours in a state of purity after they had subsided to the bottom of the phial. The supernatant liquor, when decanted and mixed with water, became immediately turbid, *and an oleaginous matter swam on the surface.*"

This is very interesting, because it shows that oil-painting was practised in England long before the days of Jan Van Eyck; in fact, if we take these entries as throwing light upon the former series, which date as far back as the reign of Edward I., it follows that the art was known in this country about a century and a half before Vasari says that Van Eyck "invented oil-painting."

The painters employed were evidently of two distinct classes, picture painters, or figure painters, and ordinary "house painters;" and the accounts show also that there were two distinct scales of charges for the colours used. The head or master painter was Master Hugh of St. Albans, who was paid 1s. a day; he was, we are told, employed in "drawing out the images" (*i.e.*, figures), painting various "images" and the "ordination" of the images, that is, their arrangement or design. We find John Cotton and William Maynard received also 1s. a day each, and worked upon the "images," and that John Elham, Gilbert Pokerich, and William Walsingham, were paid 10d. a day each, and are described as "painting the figures on the walls of the chapel." There was, however, one man, John Barneby, who received 2s. a day, but he appears only to have worked at St. Stephen's for about six weeks. Possibly he painted the portraits of the King and Royal family in the reredos under the east window, of which we give illustrations (Fig. 1). We know that William Walsingham was at work upon the great angels painted in the wall arcade (Fig. 2), and probably he, Elham, and Pokerich executed that work, and the figures of the knights on the responds below the statues of the kings; because although these are remarkably fine, yet from their being painted in a more conventional style than the pictures under the side windows, or those in the reredos of the east wall, it is probable that they were designed by Hugh of St. Albans, and executed by those working under him, whereas the latter are, judging from the fragments remaining at the British Museum, of far too individual a character not to have each been the work of one artist; probably Hugh himself, Cotton, Maynard, and other eminent painters, whose names are now forgotten, executed them. There were numerous other painters employed at wages varying from 9d. to 5d. a day, who from the work which they are recorded as doing were evidently simply decorators and gilders, and certain men were paid 4½d. per day for "grinding and tempering the colours for the painters," fixing on the "pryntes," painting the "lysure" of the windows (probably the splays or jambs).

Just as there were two distinct scales of wages paid for the two classes of workmen, so there were two distinct scales of charges for the colours used. The better colours were enormously expensive, and could only have been used in small quantities for the pictures. Even for the oils used we find this to have been the case. The following examples taken from a very long list will suffice:—

"To Master Hugh for four flagons of oil for painting the chapel at 1s. 11½d. per flagon, 7s. 6d." But elsewhere we read:—

"To the same for thirteen flagons of painters' oil at 3s. 4d. per flagon, £2. 3s. 4d."

Then we find white lead charged 2½d. per lb., and the same at 4½d. per lb., and in one place at 6d. per lb.

"Vermelon" (vermilion) is charged 1s. per lb., and again in other places 2s. per lb. The colours called cynopre and cynople vary still more. "Cynope," or cynople, is charged 8s. per lb., and elsewhere as high as 1*l.* 10s. per lb. The colour called "Teynt" (probably crimson lake) is charged for at 4s. per lb., but elsewhere 3s. 4d.; red-lead, 5d. to 1s. 4d. per lb.; and "oker" from 6d. for 4 lb. to as much as 4d. per lb. Verdegris, from 10d. to 1s. 2d. per lb. Even the gold leaf varies considerably, as we find it charged for at 4s., 4s. 6d., and 5s. per hundred, and the cheaper kind is spoken of as being used for gilding the tabernacles. Half a pound of "synopre" is in one case charged 1*l.* 10s. 6d.; that is to say that this colour cost 3*l.* 1s. per lb. in those days. Cynople is charged 20s. per lb. Now, if we multiply these by forty we shall arrive at something like the present value of these colours. We shall find that "synopre" (we do not know if this is the same colour as cynople) would cost the enormous sum of 126*l.* per lb.,—*i.e.*, about three times its weight in gold!!*

As previously remarked, some portions of the paintings executed at St. Stephen's Chapel still exist in the British Museum. They were presented by the "Royal Society of Antiquaries," who at the commencement of the century preserved these valuable frag-

* Probably "synopre," "cynople," "cynope," "cynepre," are all the same colour.

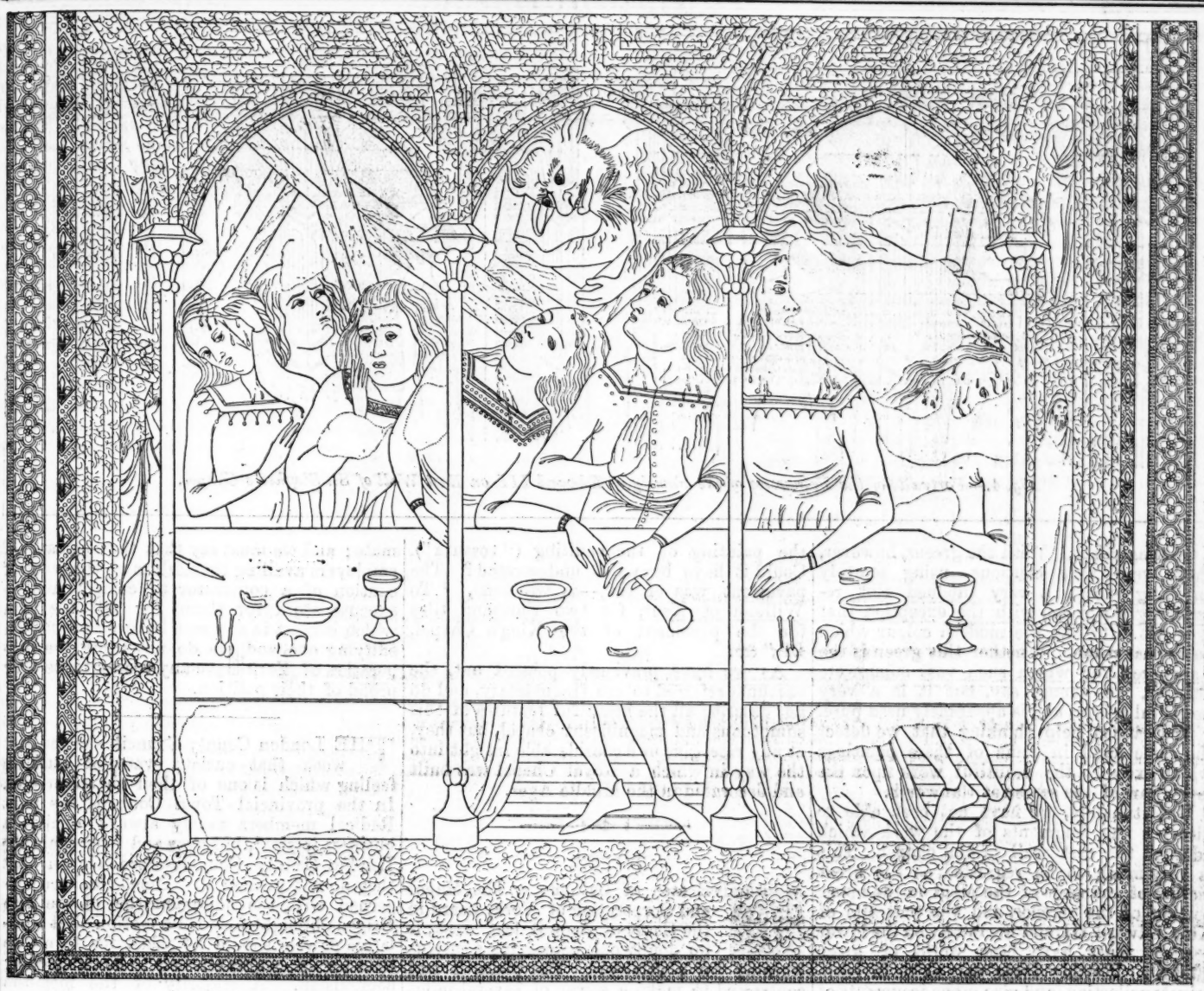


Fig. 3.—The Destruction of Job's Children: one of the Paintings preserved at the British Museum.

ments from destruction. The paintings, which could not be removed when St. Stephen's Chapel, were enlarged for the accommodation of the Irish members of Parliament, and were traced and copied for the Society by Mr. R. Smirke. The tracings are still preserved in the library of the Society, together with a water-colour drawing of the paintings upon the east wall of the chapel, with the portraits of the family of Edward III. The tracings are unfortunately rather roughly executed. No doubt the fact that much of the ornament was raised in "gesso" presented a difficulty to their being traced. These works were engraved by Basire, and published by the Society in 1807. Our illustrations of these decorations are reproduced from Basire's engravings. It should at once be pointed out that the engravings in no way do justice to the original paintings, because the artists of the fourteenth century at St. Stephen's Chapel drew with singular delicacy and beauty, although their work was to our ideas somewhat archaic, whereas the outlines here given immensely exaggerate the archaic character, and lose a great deal of the delicacy. This is especially noticeable in the drawings of the hands and feet.

The paintings now preserved in the British Museum all consist of subjects taken from the history of Job, Tobit, and Tobias. They appear to be painted direct upon the stone, with nothing intervening except a priming of red-lead, to which allusion is several times made in the accounts. How this red-lead was prepared it is impossible to say, but it has preserved its colour for over five hundred years.

These pictures are about 2 ft. long and 18 in. wide, and the following are the subjects:—

1. Job addressing his children.
2. Job's children obtain permission to attend the feast.

These form a pair.

3. Destruction of Job's children (Fig. 3).
4. Messengers of misfortune come to Job.
5. Job and Zophar.
6. Job's Comforters.
7. The Nuptial Feast of Tobias.
8. The Angel Raphael leaving Tobias.
9. Tobit and the Sparrow.

There are several peculiarities which should be pointed out. The first is this, that although these subjects are all treated in perspective, and the backgrounds are very naturalistic, yet sky painting is everywhere avoided. The spaces which would be occupied by sky are filled in with very rich stucco patterns, raised and gilt. No doubt the brilliant effect produced by this treatment would, in a decorative picture, give the general impression of sky more readily than the painted clouds by which a modern artist would attempt to convey the idea, and there is a very singular fact about this,—indeed, a kind of optical illusion, for while in reality this stamped and gilded background projects far in front of the figures, yet, when looked at at a short distance, the figures appear to stand out a long way in front of it. The treatment of the figures is more after the Early Italian than the German or Flemish method. Some of the heads, especially the female ones, in "The destruction of Job's children" are very beautiful, and show that painting in England must have been in as advanced a condition as in any other country of Europe. Even if we had not the evidence to which we have previously alluded, these pictures themselves bear strong evidence of their nationality. Especially is this the case with the architural backgrounds and the framework with which they are surrounded. The latter is very singularly treated in "The destruction of Job's children," as it consists of a bordering of square panels filled-in with little statuettes, and an arcade of three arches running across the picture; the whole carefully painted to imitate Purbeck marble. In "Tobit and the Angel" the background looks as if it had been painted from some existing building, which has a sharp pointed Early-Decorated doorway, with an arcade over it purely English in style; but in two of the pictures, "Job and Zophar" and "Job and his Comforters," a curious imitation of Eastern architecture occurs. We find minarets and highly stilted semi-circular arches, but combined with very Norman-looking battlements and panelings. The background of "Job and his Messengers" contains a great deal of architectural painting, representing a kind of cloister, the arcades of which are alternately green and pink. Strangely enough the effect of this is remarkably pretty.

The colours used in these pictures are bright and pure, and although oil has evidently been used, we are inclined to think that the ultramarine blue, and some of the lighter tints, are distemper, as they do not possess the glossy surface which is noticeable in the other colours. In the same case in the British Museum, which contains these fragments of wall pictures, are to be seen remains of the inscriptions which were beneath them, and a large piece of the beautiful parapet which surmounted the wall-arcade. The vermilion used in the decoration of this is singularly brilliant, showing that the Mediæval decorators and painters were never afraid of the use of red in a pure condition; they knew that if vermilion were used pure and unmixed it would always keep its place, but that any attempt to subdue it by the admixture of other colours had the reverse of

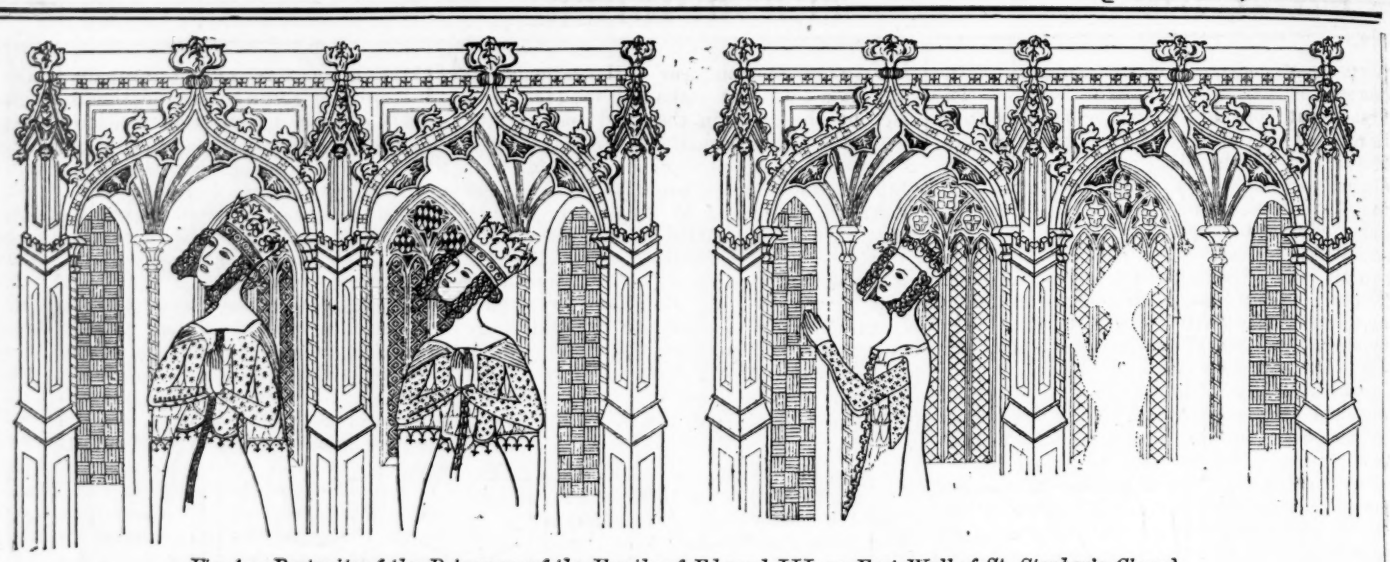


Fig. 4.—Portraits of the Princesses of the Family of Edward III. on East Wall of St. Stephen's Chapel.

a quieting effect. With the greens, however, they were very cautious, using scarcely anything except a very subdued tint resembling sap green, with the exception that it is not dirty like the modern colour which bears that name. Whether this green is the "synopre" for which such vast sums were charged, we cannot say, but it is a very beautiful colour, and is apparantly used pure.

We cannot help thinking that we detect the same hand in some of these paintings which executed the beautiful work upon the lower part of the screen at Ranworth.

Unfortunately, we have not been able to discover any fragments of the work which adorned the east wall of the chapel. This is very much to be regretted, as the great picture of the visit of the Magi in the upper portion of the reredos, and the portraits of King Edward III. and his family on the lower portion, must have been works of great interest. Possibly these may exist in some private collection, and also other fragments of this once magnificent chapel.

Of course, the effect of the interior of St. Stephen's must have been very sumptuous, but its artists were too wise to overlook the fact that repose is a necessary element of grandeur, and the way in which they quieted the combination of so much colour and gilding is most instructive and offers an invaluable hint. Under all the cornices, round the windows, between the canopies in various other situations were strictly architectural patterns, consisting of quatrefoils, trefoil-headed panels, &c., painted perfectly flat in pure *black* and *white*. Black was also largely introduced into other portions of the decoration,—notably the backgrounds to the great angels and the armour of the knights. Probably the colour charged for under the title "Cole" was black; it was liquid, as it is described as being in flagons, and immense quantities were used. Probably also that black was introduced into the stained glass, because we find "Geet (jet) bought for painting of the glass." It should be noted that the black and white were *positive black* and *pure white*, not stone colour and grey. In fact, it seems that the idea was to get the white, black, and red, as positive and pure as possible, but to temper and subdue the green and blue. Secondary and tertiary colours were used very sparingly, and seem in every case to have been isolated from their surroundings by gold; silver leaf was also used in small quantities, and there is a curious entry for silver leaf used for "painting a window to counterfeit glas!" This, perhaps, refers to one of the little windows introduced into the background of the picture of the Royal Family in the east wall (fig. 4). A very distinguishing feature is the fact that the gold seems never to have been applied to flat surfaces but always upon a stamped or raised ground; this was evidently done to avoid the glare of a gold background when applied flatly. We find no accounts for the painting of the vaulting ("vossura"). Could it have been left undecorated? The pavement was of tile,—as we read,—"To William of Kent, for two thousand tiles for the pavement of the King's Chapel, £1.," &c.

As we have previously pointed out, the accounts referred to are fragmentary, and do not describe all the beautiful features of this sumptuous and magnificent chapel, but they, at any rate, give us a considerable insight into the way in which a Royal Chapel was built and decorated in the Middle Ages.

NOTES.

THE case of Bottems *v.* The Mayor and Corporation of York, heard in the Court of Appeal last week, is no doubt one containing a serious warning for contractors. The plaintiff had contracted to make a sewer of several miles run, and after an apparently superficial examination of the ground, had sent in a tender which turned out to be the lowest, and which, in fact, was so unexpectedly low that his attention was called to it and he was given the opportunity of reconsidering his estimate, but on doing so adhered to it. No excavations or trial-holes had been made from which the nature of the soil could be ascertained, and when the work was commenced the soil was found to be of such a muddy and porous nature that not only was extensive timbering necessary, but a great deal of the work was ordered by the engineer (who was quite within his rights on this point) to be re-constructed, owing to the manner in which the brickwork had been crushed by the pressure of the soil. The contractor found the work would be ruinous to him, and claimed that the re-construction ought to be counted as new work. Mr. Justice Mathew decided against him with reluctance (though there could hardly be any doubt as to legal obligation of the contractor), and on appeal there was the same result: judgment for the defendants, accompanied by judicial expression of sympathy for the plaintiff. The practical lessons from this important and unfortunate case are, that contractors should take every pains to ascertain the nature of the ground before undertaking such a contract, and that it is desirable, in fairness to both parties, that some clause should be inserted providing for special modification of the conditions on the judgment of the engineer, on the discovery of any exceptional difficulties which could not be ascertained beforehand. But there is perhaps a moral consideration suggested also. The defendants in this case claimed only their legal rights; but what about their moral duties? The additional cost of the works was not the fault of the contractor; the condition of the ground being such as it proved to be, the cost in any case must have been far greater than the contractor's estimate; and we must say that the spectacle of employers availing themselves of the want of caution of a contractor to compel him to execute work for them for half the sum which it must in any case have cost is not an edifying one, and we do not think the Corporation of York have any reason to be very proud of their position.

THE London County Council showed last week that curious want of business feeling which is one of their characteristics. In the provincial Town Councils the most Radical members nearly always exhibit a business instinct, but over and over again the London County Council have shown that they do not possess it. The Committee concerned with the administration of the Fire Brigade brought forward a motion that legislative powers should be asked for to enable sites for fire-engine stations to be obtained by compulsion. A majority of the members present, however (as we reported), carried an amendment to the effect that power should be obtained to take land compulsorily for any public purpose. The first proposal was reasonable and business-like; the latter, unreasonable and unbusiness-like. There was a clear and definite object for the application of compulsory powers of purchase in the first proposal; in the second, the object was essentially vague. The practical result will be that, whereas Parliament would almost certainly have granted the Council power to take land for the purpose of fire-engine stations, it will assuredly refuse to hand them a blank cheque, such as some of the Council desire. Consequently, compulsory powers for a useful and defined purpose will not be obtained, simply through the want of this business instinct to which we have referred.

L'ARCHITECTURE for July 16 gives a general view of the Roman ruins discovered at Timegad, in Algeria, the ancient Thamugas or Thamugadi. The view is a very striking one, and in the distance is seen the triumphal arch of which we published, in the *Builder* for October 4, 1890, a view and a restoration from the pencil of Mr. Alexander Graham, F.S.A. Mr. Graham accompanied those illustrations by some interesting notes as to the remains, and we may now refer our readers to the article entitled "Une Pompéi Algérienne" in the current number of *L'Architecture*, already mentioned, for an *étude* on the ruins communicated by M. Albert Ballu, chief architect in charge of the *monuments historiques* of Algeria, to the archæological commission of the Société Centrale des Architectes Français.

THE Aachen branch of the Society of German Engineers some time ago appointed a committee to consider the subject of steel in reference to recently-developed processes, and its extended adoption for

purposes of construction. The report of the committee has recently been issued. The first point considered was whether soft or hard steel should be preferred, under general conditions, for building purposes. The conclusion arrived at was that, generally speaking, the softer steel is preferable. For ordinary industrial purposes the tensile strength should be between 23·45 and 28·60 tons per square inch, the minimum extension being 20 per cent. in 8-in. specimens. For bridge material the tensile strength should be between 23·45 and 27·30 tons per square inch. The report considers that it is not desirable to specify any chemical analysis, as the physical properties afford a sufficient index to the composition of the metal, and the result depends not only upon the quantitative identification of the component substances, but also upon their mechanical combination. It is, however, considered advisable to specify not only the class of material, but also the precise method and conditions of its production; but the committee are of opinion that the specification must be limited to such general normal conditions for the identification of quality as can indubitably be conformed to, and that any minute limitations are technically impracticable and without result, and, further, that they are commercially injurious. With regard to manipulation, the report chiefly notes that it is undesirable to work steel at a blue heat. Finally, the committee are of opinion that the working load might safely be increased to 6·35 tons per square inch for live loads, and 7·62 tons per square inch for dead loads. It will be gathered from the above that the German committee has not discovered any very new or startling points; but the conclusions are worthy of attention as being the expression of a competent body of engineers, belonging to a country where the use of steel for structural purposes has received intelligent appreciation, if not equally wide adoption. No doubt the committee are right in eliminating chemical analysis, which has done more to lead users astray than anything else. A very bad and a very good steel may show an almost identical analysis. Chemical investigation is for steel makers, not steel users; and even by the former it must be applied with great discrimination, and in conjunction with physical tests.

ON the 9th inst. we announced that the ruins of the Palace at St. Cloud are about to be removed. The château was burnt down on October 13, 1870, and many of the houses around met with the same fate after the battle of Buzenval. The château which Pierre de Gondi, Archbishop of Paris, built here in the sixteenth century was acquired in 1658 by Louis XIV.'s brother, Philippe d'Orléans, who caused it to be rebuilt, employing as his architects Jules Hardouin Mansart, nephew of F. Mansart, Girard, and A. Le Pautre. Le Nôtre laid out the park, famous for its fountains and autumn fair. St. Cloud was a favourite residence of Marie Antoinette and of the Buonapartes in the first and second Empires. In the Maison de Gondi, the Dominican friar, Jacques Clement, assassinated Henri III., whose army lay on these western heights above the Seine, ready to advance upon Paris. The Council of Five Hundred used to assemble in the Orangery, until driven out by Napoleon. Originally known as Nogent, St. Cloud took its name from a monastery founded there in 538, by Hlodoald,—a son of Hlodomir, the Merovingian King of Orleans,—who made it his retreat after his brothers had been murdered. Le Mans, to which we referred at the same time, is also associated with the history of the Merovingian dynasty, our own Plantagenets, and the late war; for here, on January 12, 1871, the Germans gained the day in their final field engagement with the French. Marceau defeated the Vendéan army, under Larochejacquelin, at Le Mans, their last stronghold, in 1793, when a terrible carnage ensued. Besides the "House of the White Queen," we may mention that of Scarron, near to the cathedral of St. Julien. In that cathedral, founded, it is said, by the saint in the third century, and celebrated for its beautiful thirteenth-century choir, were set up monuments to Richard I.'s Queen, brought from Epau Abbey; to Charles of Anjou, 1474; and to Langey du Bellay, *temp.* Henri II. Many of its features are illustrated in Viollet le Duc's work; the aisle walls are supposed to be of the eighth, or ninth, century. At Le Mans was born Henry II., son of the Empress Mathilda, by her marriage to Geoffroi d'Anjou, who chose for cognisance of his house a sprig of the broom growing plentifully in his native province of Anjou and Maine.

A PAPER by Mr. W. L. Saunders has been recently contributed to the American Society of Civil Engineers, in which some interesting details are given of the Knox system of drilling for rock blasting. The aim of this plan is to release the stone from its bed by directing the force of a blast to cleave the rock in a prescribed line without injury; or to split large blocks into smaller sizes without waste. The principle followed is, that if a hand-drilled hole be made approximately triangular, the line of rupture will follow the direction of the corners. In experiments previously made in sandstone, a blasting canister of diskoid form was tamped in a large circular hole, with its edges in the vertical plane, and in the prescribed line of fracture. In this way good results were obtained, though at a loss of material, owing to the large hole which was necessary to take the diskoid canister, but straight and true breaks were secured which followed the line of the disk edges. It was also known that square prismatic canisters gave two planes of fracture at right-angles to each other. For blasting granite the "lewising" system is followed. This consists of drilling two, three, or four holes in the line of desired fracture and breaking down the material between them. In the Knox system an ordinary round hole is drilled and then worked on two opposite sides, so as to give a cross section, which might be described as a square with each of two opposite corners filled in by a circular sweep, or as a circle with two angles added outside the periphery. The angles point to the required plane of cleavage, they supplying weak points from whence the crack starts. Into this crack the powder gases escape, to act like a wedge in continuing the fracture in a straight line to the extent of the force available. By this system very little material is wasted, and in no case in any rock should the holes be drilled above $1\frac{1}{2}$ in. diameter. Hard rocks require less powder than soft, and soft rock requires holes at every 4 ft. and 5 ft., the charges being fired simultaneously by electricity. The tamping by the Knox process should not be directly on the powder, but an air space, as long as possible, consistent with sufficient tamping not to blow out, should intervene.

IT is high time that some steps were taken by the First Commissioner of Works to improve the open desert to the west of the Law Courts. The slope immediately in front of the new Bankruptcy Court is now green and pleasant to the eye, but the space to the south of the main walk is merely bare ground. It is clear that this portion should be laid out with walks and small open spaces, which should be supplied with seats. Some of these spaces should be grass-plots, others should be asphalte or gravel; on these latter places the children could play. The grass to which we have alluded above is only kept green because no one is allowed upon it. But a walk should be made completely round it, some trees planted, and seats placed at various distances, as in the gardens on the Embankment. This open space, even in its present state, is a great boon to the district in which it lies, but it might easily be made not only more pleasant for those who frequent it, but more worthy in appearance of the metropolis.

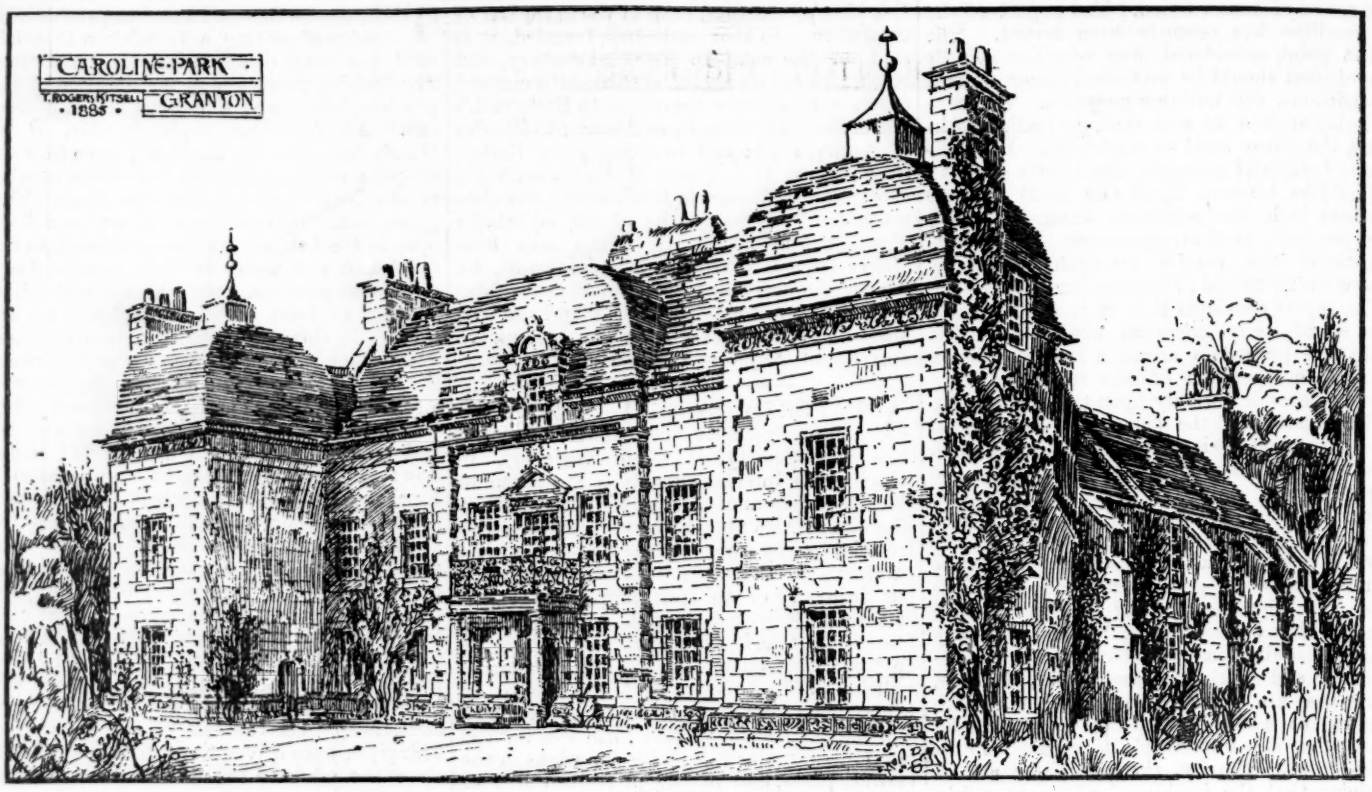
THE, at one time, all but insuperable difficulty of getting a foundation in quicksand has been disappearing for some time. The freezing process was one solution of the problem, but it was a tedious and expensive one. An American engineer, Mr. R. L. Harris, has gone on another principle, a description of which is given in a recent number of the New York *Engineering News*. Two pipes, some little distance apart, and both open at the bottom, are forced down into the quicksand, and water is then pumped down the one at pressure, upon which it will follow the line of least resistance and rise up the other. In this way a channel is established, and the sand will be washed away between the two pipes, leaving a cavity. In this way a series of cavities can be formed, and when this has been done, the outlet pipes are closed, and a fluid grouting of cement is pumped down. This permeates the adjoining material, forming a compact mass which hardens into a block of concrete. By withdrawing the pipes the concrete is built up to the surface, and a good foundation may be thus obtained. Details are given of an experimental application of the process to the construction of a sewer in a very treacherous quicksand in Providence, in the State of Rhode Island. The trench for the sewer was about 12 ft. to 16 ft. wide, and from 20 ft. to 30 ft. deep. On the line of the work four 2 in. pipes were driven down to a level of 1 ft. above the grade of the sewers. These pipes were 4 ft. apart, and, by means of a current of water through them, cavities were quickly swept out round their lower ends. When this had been done, a smaller pipe, fitted with a valve at its end, was slipped down each of the 2-in. pipes. When this pipe projected below its main pipe, there was a free passage for fluid either up or down, but when it was drawn up a little, no fluid would flow in an upward direction. The cementing fluid formed a solid mass with the sand, and, the earth being removed, a stone-like slab, about 6 in thick, was found, connecting the points where the cement had been injected. Beneath this, and parallel to it, were thin sheets of cemented material. The principle is not altogether new to us, as Mr. J. H. Greathead has already followed much the same lines in the application of his method of construction of deep tunnel railways in going through water-bearing strata, using both the hydraulic means of excavation and the grouting to obtain a water-excluding crust.

THE members of the London County Council appear to be under the impression, from what was stated during the debate on Tuesday, that the new Parliament will regard such proposals as that known as the "betterment" principle more favourably than the Parliament which has lately been dissolved. But this belief seems to want foundation. No doubt a larger number of members are pledged to what is known as "the London programme," but we do not anticipate that any startling changes in regard to compensation and other matters of a similar character are likely to take place next session.

THE versatility of some of our own "advertising architects" sinks into insignificance before that of their brethren of North Queensland, Australia, if we may judge from an advertisement, cut from a local paper, which has been sent to us. It reads,—

"———— & Co.,
ARCHITECTS, AUCTIONEERS,
LAND, ESTATE, FINANCIAL,
INSURANCE, AND
GENERAL AGENTS,
ACCOUNTANTS & VALUERS N
INSOLVENCY.
HORSE AND CATTLE SALESMEN,
HOTEL BROKERS.
Agents for
The ——— Agency Co."

Our readers (adds our correspondent) will no doubt be surprised at the high position which architecture has attained in the Colony.



Perspective View of South or Principal Front.

"CAROLINE PARK," GRANTON.

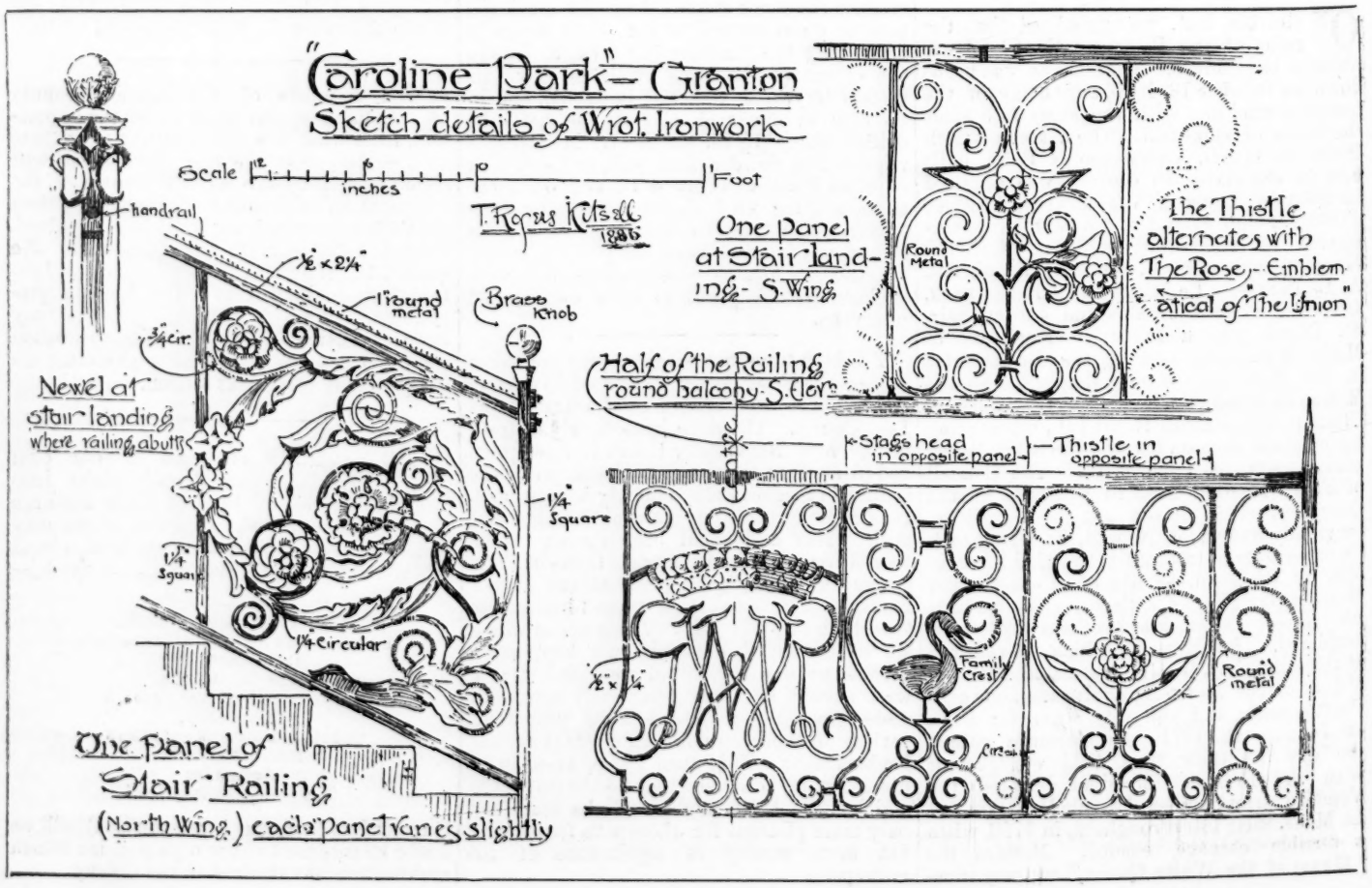
PICTURESQUELY situated about three miles north-west of Edinburgh, and on the shores of the river Forth, this interesting old house stands so secluded that the ordinary passer-by knows not of its existence, and even the architect would remain ignorant but for the fine entrance-gate pillars to the grounds, close on the road-side. It was built at the close of the seventeenth century by Sir George Mackenzie, Lord Tarbat, Prime Minister in Scotland under James VII., and who was, in 1703, created Earl of Cromarty by Queen Anne. His name, and that of his wife, are carved along the friezes of the pavilions of the later south front. The following translation of the inscription in the panel over the north front gives shortly the Viscount's reason for building his house. It reads:—

"Riches accumulated are valueless, but spent are useful. With lands come cares. For our own and our friends' comfort, George and Anna, Viscount and Viscountess of Tarbat, have caused this cottage to be built in the year of the Christian era, 1685. The guest is our care, for the house of entertainment is now ours, then another's, and afterwards I neither know nor care whose, for there is no certain dwelling-place. Therefore let us live well while we may."

Originally the principal entrance was the north one, but in 1696 the south front was remodelled, and is built in ashlar, the original doorway and some of the window lintels peeping out from under the new stone casing. This alteration is interesting in showing the advance towards the more Classic style.

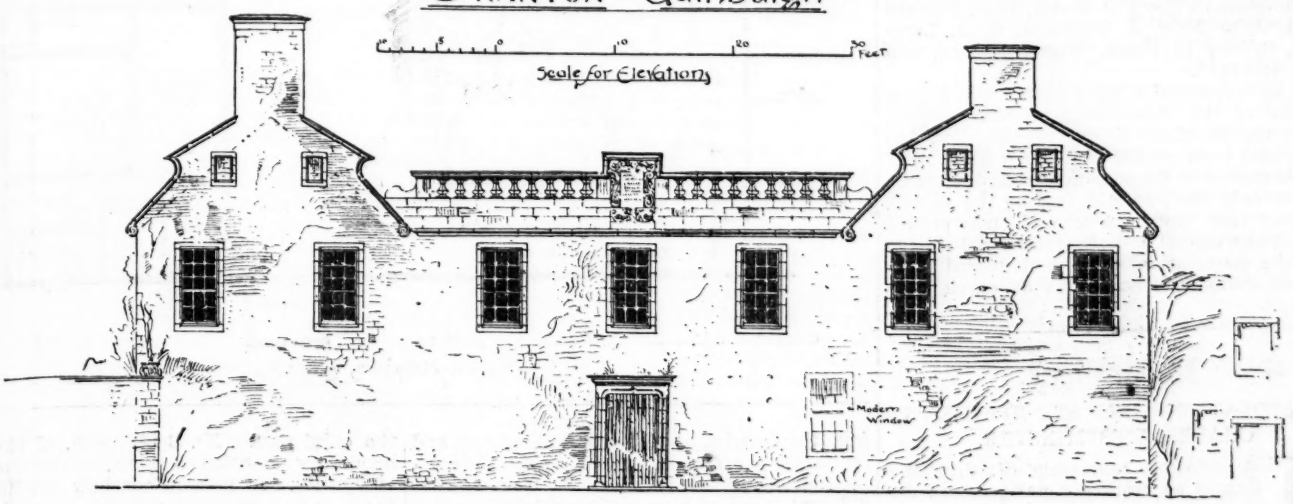
The house is full of good detail in wrought ironwork, wood-panelled walls, and fine plaster ceilings with centre subject paintings, signed "N. Hevde, inventor" (an assistant to Antonio Verrio, an Italian painter invited to England by Charles II. to execute work at Windsor, Hampton Court, &c.). Several of the wood-panels over the fireplaces are also painted.

In 1739 Royston was purchased by the Duke of Argyll and Greenwich, from whom it passed in 1793 to Henry, Duke of Buccleuch, and is still held by the present Duke. This fine old house is now chiefly used as the offices of the well-known firm of A. B. Fleming & Co., who know how to care for it, and are always most

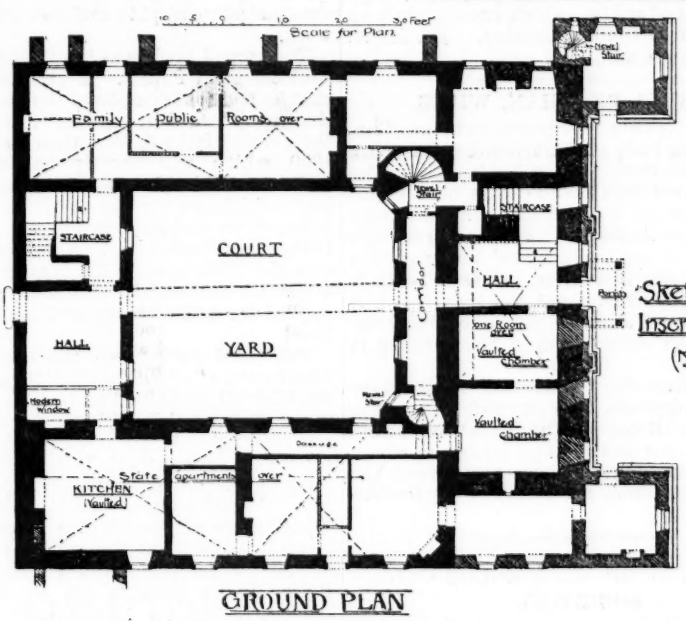


CAROLINE PARK FORMERLY ROYSTON HOUSE

GRANTON - Edinburgh

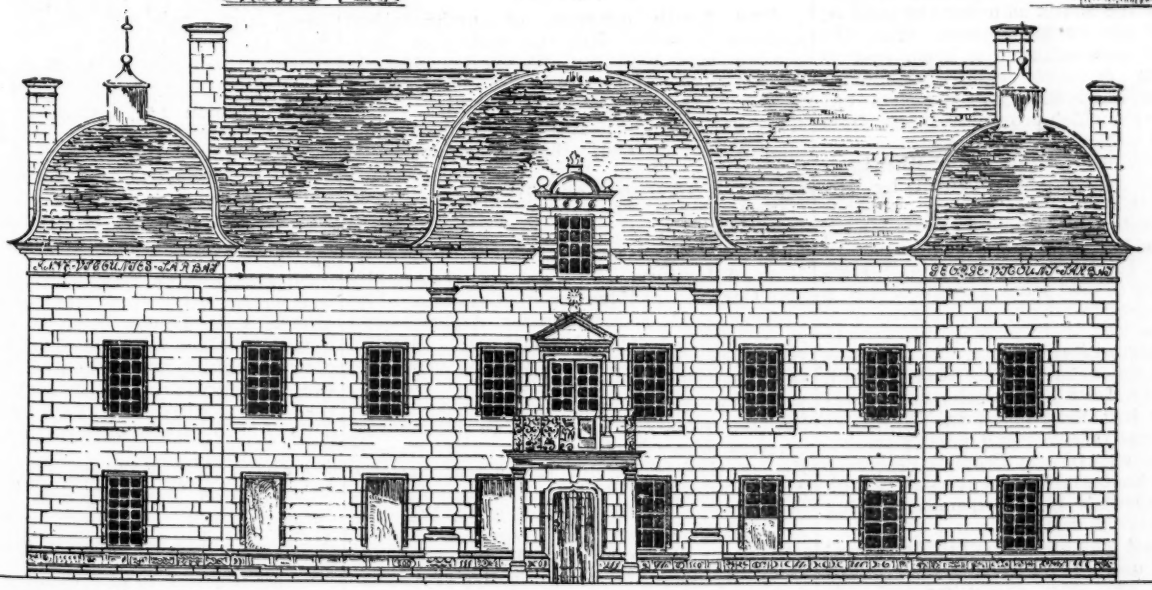


THE NORTH ELEVATION



GROUND PLAN

Sketch of the Inscription panel (North front)



THE SOUTH ELEVATION

T Rogers Kitsell
when at Delt 1885-6

willing to "clear the way" for the student of architecture who applies to them for permission to make free of their premises to sketch or measure.

T. ROGERS KITSELL.

ABERDEEN.—Lord Provost Stewart presided at a meeting of the Aberdeen Town Council on the 18th inst., when Mr. William Dyack, the present assistant, was appointed Burgh Surveyor, in room of Mr. W. Boulton, resigned, at a salary of 400*l.*, rising annually by 50*l.* to 600*l.*

THE ARCHITECTURAL ASSOCIATION.

WE are informed that a special general meeting of this Association will be held at 9, Conduit-street, W., this Friday evening, July 22, at 7.30, to consider the resolutions printed in the following requisition :—

"To the Hon. Secs., Architectural Association.

Under the terms of By-law 43 we hereby require you to call a Special General Meeting of Members to consider the following resolutions :—

1. 'That the Committee having declared that one of the names placed on the voting lists recently issued was improperly so placed,—the gentleman having resigned his membership,—the Committee alone are responsible for the error, as no public notice whatever is taken of resignations during the session, and therefore the general body of Members does not know who has resigned.'

2. 'That the number of votes given to this gentleman (now declared to be lost) would have been distributed among the other candidates, and that, therefore, the declared result of the voting is most unsatisfactory and misleading, if not actually invalid.'

3. 'That this meeting, therefore, directs the secretaries to issue proper and correct voting papers, to

secure their proper counting, and to have the result duly declared as the election of Committee and officers for session 1892-3.'"

The requisition is signed by Messrs. C. H. Brodie, Walter Dewes, A. F. Cutler, Chas. H. Freeman, Percy E. Newton, Sydney Tugwell, Edwd. Greenop, Percy D. Smith, Thos. Edward Pryce, John Todd, J. Stransom, G. A. Lansdown, Sydney B. Beale, Walter Millard, and J. W. Stonhold.

We have received a letter from a well-known member of the Association on this subject, supporting the views of the requisionists, but we refrain from publishing it, as it contributes no new matter to the controversy, and, from its tone, is only likely to add fuel to the flames. We trust that moderate counsels may prevail on both the official and the non-official side, so that the Association may be delivered from internal strife at so important an epoch in its history.

Illustrations.

RESTORATION OF ST. STEPHEN'S CHAPEL, WESTMINSTER.

THIS drawing represents St. Stephen's Chapel as originally finished and decorated; for further description the reader is referred to the first article in the present number, which is to be read in connexion with this illustration.

TROSLEY TOWERS, KENT.

TROTTERSCLIFFE, corrupted in recent years to "Trosley," is near Wrotham, in Kent, about half way between Sevenoaks and Maidstone, on the crest of a hill 686 ft. above sea-level, well-wooded, and commanding extensive views on the S. and S.E. down the valley towards Aylesford. Immediately underneath runs the well-marked "Pilgrim Road," known to Chaucer. Not many miles distant lies the beautiful old moated grange of Ightham.

For many years the country house of Sir Sydney H. Waterlow, Bart., has been at Fairseat, an interesting, but small, example of Early Georgian building, within a mile of Trosley. Having purchased an extensive estate, chiefly among the wooded height of Trosley, he has recently erected "Trosley Towers," a mansion of red brick with stone dressings, from the designs of Mr. E. R. Robson, F.S.A., architect, of which the hall is the subject of our illustration.

In the general plan of the house, the object naturally was to place as many rooms as possible towards the south, both for the sake of sunshine and the beautiful view. Thus, the main corridor runs along the back, and is entered from a *porte cochère* which is reached from a winding carriage-drive cut through the trees which protect the house from the north and east winds.

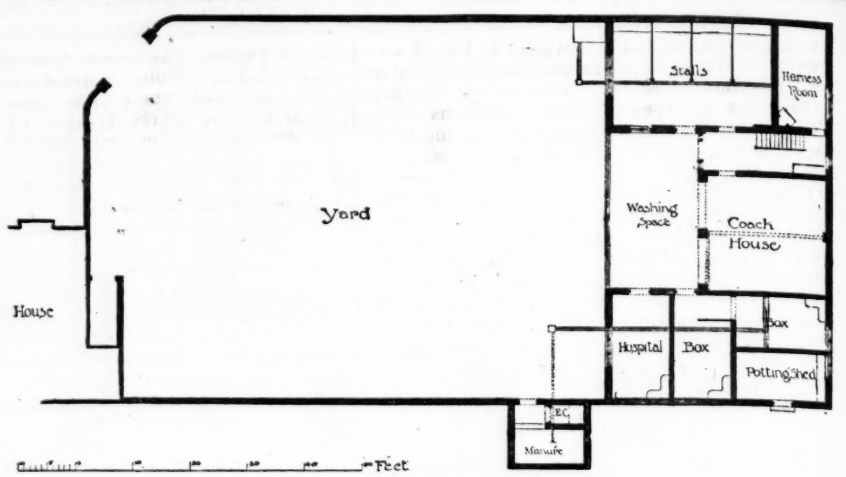
The Hall at Trosley Towers is another illustration of the importance attached by Mr. Robson to this leading feature, whether applied to a first-rate house, a first-rate school, or indeed to buildings of other kinds. In enlarging Mr. Henry Tate's house, at Streatham Common, a few years ago, he added a double billiard-room which, as a central hall, has proved the key of the plan in reference to the daily comfort of the house. In the plans prepared for the rebuilding of Gunton Hall, near Cromer, for Lord Suffield, the same treatment (which had been found in Vanbrugh's conception) was retained and greatly emphasized. In the case of the People's Palace at the East-end, he built the great central hall, called the "Queen's Hall," without knowing what other building was to follow.

In the present instance the hall is the general resort, and also the room whence the gardens and terraces are most easily reached. It extends vertically through two of the stories of the house, and its apparent size is increased by the manner in which the main staircase of oak is seen through one of it sides.

The builder of the house was Mr. Shepherd, of Bermondsey, and the clerk of works Mr. James Softly. The whole of the plumbing and drainage was carried out by Messrs. Dent & Hellyer.

BATTERSEA POLYTECHNIC INSTITUTE.

WE published in the *Builder* for March 28, 1891, the plan and the competition perspective of this building; the view here published is from the drawing in the Royal Academy, and represents the front as modified since the competition; the whole is shown also from a rather different point of view. The chief alteration is in the introduction of the projecting bays beneath the end gables, which are certainly an improvement to the composition. Mr. E. W. Mountford is the architect.



Stables, Pewsham, Wilts.

STABLES, PEWSHAM, WILTS.

THESE stables are now in course of erection, and are being built of Cattybrook bricks, with Ham-hill stone dressings and Ruabon tiles. The floors are paved with Staffordshire blue bricks, and the drainage is arranged so that all traps and gullies are outside. In addition to the loft for hay and straw, two grooms' bedrooms are included on the first floor. Messrs. Light & Smith, of Chippenham, are the builders; and C. E. Ponting, F.S.A., of Marlborough, is the architect from whose designs the building is being erected.

The drawings from which our illustrations have been taken are now on exhibition in the Architectural Room at the Royal Academy. We gave a view and plan of Pewsham House itself (now in course of erection, from the designs of the same architect) in the *Builder* for June 18 last.

CONGRESS OF ARCHÆOLOGICAL SOCIETIES.

THE fourth congress of archæological societies in union with the Society of Antiquaries was held on Wednesday last in the rooms of the Society at Burlington House. Representatives from the following associations were present:—Royal Society of Antiquaries of Ireland, British Archæological Association, Royal Archæological Institute, Oxford Architectural and Historical Society, Oxford Archæological Society, Norfolk and Norwich Antiquarian Society, Kent Archæological Society, Bucks Archæological Society, Midland Institute (Birmingham), Lancashire and Cheshire Antiquarian Society, Shropshire Archæological Society, Sussex Archæological Association, Surrey Archæological Society, Derbyshire Archæological and Natural History Society, Berks Archæological Society, Yorkshire Archæological and Topographical Society, Woolhope Field Club (Hereford), Somersetshire Archæological and Natural History Society, Bristol and Gloucestershire Archæological Association, St. Albans Archæological and Architectural Society, Wiltshire Antiquarian Society, the Huguenot Society, Society for Preservation of Memorials of the Dead, and Society for the Protection of Ancient Buildings. The chair was to have been taken by Mr. A. W. Franks, C.B., President of the Society of Antiquaries, but in his unavoidable absence it was ably filled by Sir John Evans, the late President, and subsequently by Dr. Drury Fortnum, Vice-President.

The first subject for discussion was the Archæological Survey of England. Mr. W. H. St. John Hope introduced the subject, explaining that as yet only three counties were completed,—namely, Kent, Hertfordshire, and Cumberland,—but that several others were now in progress. There was a brisk, but technical, debate as to the best marks and divisions to use in drawing up such maps, in which Messrs. Gomme, Parker, Sparrow, and Ferguson took the chief part. Mr. Brassington, of Birmingham, drew attention to photographic surveys of antiquities, and pointed out how the Midland Institute had procured valuable series of antiquarian photographs by enlisting the aid of amateur photographic societies, directing their work.

The second topic was the Classified Index of Archæological Papers. Mr. Gomme announced that he had just completed the full index of all the papers issued by the local societies of Great Britain and Ireland, from their origin down to 1890, which will shortly be published. In addition to this, Messrs. Gomme and Hope have just completed for the societies in union an index of the archæological papers published in 1891. Mr. Hope said that it was amusing to note the difference in the requirements of the associated societies for this index: one society applied for 1,200 copies, and another for only four!

The third subject on the agenda was the "Restoration" of Ancient Buildings, upon which Mr. Micklethwaite read an incisive and vigorous paper that bristled with good points, and yet was reasonable in its advice and conclusions. Mr. Parker spoke especially against the habit of scraping the old masonry, thereby obliterating masons' marks and other historic evidence.—The Chairman thought that three things combined brought about the mischievous renewing of churches,—(1) a young and enthusiastic High Church parson; (2) an ill-instructed architect; and (3) an old lady with a long purse.—The Rev. W. Creeny, of Norwich, drew the attention of the Congress to the mischief threatened by the Dean of Norwich to the old stalls and choir fittings of the cathedral church, which he desires to turn into a "great preaching place."—The Rev. Dr. Cox raised a timely protest against the spoiling of old chancels by needless organ chambers, and instanced a case in which this had recently been proposed by an "F.S.A." architect, but the proposition had happily been overruled. Mr. Brassington proposed the printing of a good pamphlet on true and improper restoration, but Mr. Ralph Nevill said that that had been already done by the Institute of Architects. Several speakers laid the chief blame of mischievous church restorations on the architects; but Mr. Micklethwaite, in reply, pointed out that no architect had any *locus standi* to destroy or otherwise until he was called in by the clergyman.

A fourth subject was the "Desirability of a New Skeleton Map of Roman Britain," introduced by Mr. Milman, Director of the Society of Antiquaries, but the project did not receive much support.

"The Desirability of Compiling a list of all Benefaction Tables previous to 1800 in Parish Churches" was brought forward by Mr. Gomme, and met, on the whole, with favourable consideration. It was stated by some that the work had been already done in the old Charity Commission Reports; but the Rev. Dr. Cox said that, so far as Derbyshire was concerned, those reports were capricious, fitful, and unreliable. Mr. S. W. Kershaw thought that the matter ought to be accomplished by the authorities of the Church.

A paper on "Local Museums," written by Mr. Payne, and read by the Secretary of the Society of Antiquaries, was full of good suggestions. It was decided, after an interesting and practical discussion, to refer the paper

to the Standing Committee for its revision and enlargement, so that it might be issued as a guide to the due arrangement and carrying on of provincial museums. Allusion was made to the series of papers on local museums, showing up their deficiencies, and commenting on all good arrangements, which is now appearing in the *Antiquary*.

The members of the Congress dined together in the evening at the "Criterion," Mr. Franks, C.B., in the chair. Afterwards the President held a reception of the Fellows of the Society of Antiquaries at Burlington House to meet the Congress members. The suite of rooms contained a great variety of objects of interest specially displayed. The most important of these was the splendid collection of finger-rings, the property of Dr. Drury Fortnum, F.S.A.

THE ROYAL COMMISSION ON METROPOLITAN WATER SUPPLY.*

HAVING completed our digest of the evidence as to the pollution of the Thames, upper and lower, we now summarise that relating to the pollution of the Lea. After indicating the scope of the mortality tables submitted by the Medical Officer of Health, as bearing on the relation between disease and water supply, we condense a compendious statement by Dr. Frankland, the water examiner, on the past and present conditions of the two rivers. The statement was the basis of a long examination on bacteriological problems, which, as we have already stated, have been referred by the County Council to the Royal Society, which has appointed a special water research committee. It has also been stated incidentally by the Chairman of the Commission, Lord Balfour of Burleigh, that there is much in the detailed reports upon the rivers and their tributaries which is unsuitable for investigation by question and answer over the table, and must be remitted for consideration by an assistant commission.

The Pollution of the Lea.

Dr. Geo. Turner, M.B., D.P.H. Camb., Medical Officer of Health for the counties of Herts and Essex, &c., said that at the request of the London County Council he had examined the Lea and its tributaries, whose valleys comprised parts of Herts, Essex, and Bedfordshire. The population of the area would be between 143,688 and 145,799. About 95,000 persons living in towns and villages discharged sewage effluents, after more or less purification, into the river. For 85,000 the purification was efficient; for 5,500, in three villages, it was a "pretence of purification;" five villages, containing 7,000 inhabitants, ran unpurified sewage into the streams. About 40,000 live remote from the banks, and in rainy weather their drainage, greatly diluted, passed by ditches to the river. He had noted pollution from 367 houses, twenty-four mills, twenty-one farms, six public-houses, two schools, and five slaughter-houses or places where pigs were occasionally slaughtered, the inhabitants of the places numbering 2,000. In addition, at various places, such as Stansted, Standon, Braughing, Aspeden, Widford, Hormeal, &c., sewage enters the river through ditches and rain-water drains not directly connected with premises occupied by perhaps 2,000 persons. Sewage, sewage effluent, or slop-water from 100,000 persons reaches the Lea, and its tributaries, above the intakes of the water companies. Omitting those maltings which go into sewers discharging upon sewage farms, no less than 8,896,250 gallons of malting water are turned into the streams. This malting water is highly charged with putrescible organic matters, and speedily becomes very offensive. An analysis of some malting water showed that it contained 135½ grains of organic matter per gallon, which would give 76·8 tons as the total amount discharged into the river in one year. This pollution was called barley water, and, although it might not contain specific organisms, it supplied them with the means of living when they obtained access to the water. The safety of consumers depends upon three things:—1. The quantity of clean, spring water, which reaches the streams, and which serves to dilute and oxidise the organic matter contained in the sewage; 2. The length of the flow between the point of pollution and the intake in which oxidisation may take place; and 3. The filtration which the water undergoes at the hands of the companies. The result of personal inquiries made from persons working mills on the rivers is that there has been a loss of 50 per cent. of water in the Lea, the Beane, the Mimran, the Kib, and the Ash, and none, or practically none, in the Stort. The pumping at the New River well at Broxbourne has reduced the level of an adjoining well by 14 ft., and at Stevenage the average height of the water in a well is 13 ft. less than it was five years ago. The filtration by the companies is probably as efficient as it can be made. In 1883, 1884, and 1886 at Hertford, and at Stansted in 1892, the consumption of unfiltered Lea water has produced typhoid. The possibility of improving river water by intercepting drains is much overestimated. Numerous analyses by several experts, and intimate knowledge of the state of affairs at Hertford, indicate that the treatment of the sewage there gives, not drinking water, but water which is quite harmless to a navigable river, and that the dark colour is caused by the soil over which it flows and the mismanagement of the Lea at this point. Above Hertford at Wheathampstead (pop. 2,000) there is in operation a precipitation process so little efficacious that it does not remove the colour of blood from the sewage. At Whitwell, on the Mimram (800), the sewage is led by gravitation on to some land, but in time of storm all the sewage passes directly into the river. Wellwyn, on the Mimram (1,800), has a process of straining, but discharges a "foul sewage effluent." Harlow, on the Stort (3,000), discharges its sewage improperly; it flows off the land without going through it, at the rate of 60,000 gallons in twelve hours; and the effluent was described by Mr. Dibdin as "ordinary sewage." Stevenage (3,300) and Watton (700), with a slaughter-house, drain directly into the Beane. These examples from a list of pollutions show that untreated sewage in large quantities reaches the rivers above the intakes. No improvement in the cases of towns and villages will render the Lea water fit to drink while the land is used for agriculture and the river for transport, especially the transport of manure. It is not at all like ordinary stable manure, but is indescribably filthy and has every opportunity of being specifically contaminated. Much of it is deposited on the banks just above the intake of the East London Company. The quantity is about 50,000 tons a year, or ten times the excrement of the total population above the intake. We do not know how far filtration protects from typhoid fever; but the Caterham epidemic showed that a pollution so small that it could not be detected chemically was sufficient to poison an enormous quantity of water. If it should be proved that careful filtration does protect from typhoid fever this will not show that it will act equally well in the case of cholera. In 1886 the overflow of a specifically polluted ditch caused enormous harm wherever the fouled East London water was taken. In 1866 the filtration was probably defective, and the same misfortune might occur again. It is a mistake to use Lea water for a public supply, as it is impossible to stop the navigation of the river and the cultivation of the land. The Lea rises 35½ miles from the East London intakes, and it receives effluents or minor pollutions from Luton, 32,957; Wheatampstead, 2,457; Hatfield, 4,120; Hertford, 8,300; Ware, 5,121; Stanstead Abbots, 1,405; Hoddesdon, 3,439; Broxbourne, 788; Cheshunt, 10,000; Chingford, 1,517. On the tributaries are several smaller towns.

In answer to many questions, Dr. Turner said that he regarded an effluent as efficiently purified for a navigable stream if it did not kill fish, stop up the stream, or create a nuisance. There would always be risk in using such a stream below the effluent discharge as a source of water supply. Still a river was the natural drainage for a purified effluent. At Wheathampstead (2,450) there was in operation a kind of precipitation process so little efficacious that it did not take out of the sewage the colour of the blood of pigs that were being slaughtered in the town; and you could see the course of the effluent along the side of the stream for 20 or 30 yards. A similar pretence of purification was made at Wellwyn and Harlow. Five places that run unpurified sewage into streams are Stevenage, Walkern, Watton, Wormley, Stansted Mount Fitchet, and Stansted in Essex. The evidence that the quantity of spring water is decreasing is that millers cannot run so many stones as they used to do, and that beds for watercress, which must have spring water, have been damaged or gone out of cultivation at Coldharbour, Whitwell, Stansted, St. Margarets, Rye House, Amwell, and Hoddesden. At Amwell two adjoining pumps of the New River Company dry the bed in two hours. At one place, when the owner complained of the loss of water, the Company ceased pumping. Another time the Company continued pumping, and the renewal of the plants cost between 200*l.* and 300*l.* Below Luton the beds have been given up because of the want of water, and not on account of the sewage effluent. "They cultivate watercress in sewage very often, and that is why I never eat them in London." Reminded by the Chairman that the tendency of the milling trade was towards the coast, for the grinding of imported grain, Dr. Turner said the mills on the Lea had ceased running, not because they had not the stuff to grind, but because they had not the water to turn the wheel. Better draining, no doubt, prevents floods soaking the land, but the loss of water is not so much complained of on the Stort, which runs over clay, as it is on the Lea. There is not a better sewage-farm in the country than that of Luton, but pumping stops from 3 a.m. to 8 a.m. The water then in the sewers is largely subsoil water, but in the sewers it becomes coloured from the colour used in dyeing straw, and sometimes it is so highly coloured that it has to be pumped on to the farm. The population in the valley of the Lea has increased from 136,000 to 145,000 in ten years, and soon it will overlap the intake of the East London Company; and a river flowing through a town must be dirtied by the washing of the streets. There was no reason why all the sewage of towns should not be efficiently treated, and, if it was so treated, the only pollution from human beings would be the occasional pollution in time of flood from 47,000 people scattered over an area of 500 square miles. Whatever improvement might be made in sewage effluents, the river would not be a good supply for domestic purposes while used for navigation, because you might have a man on a barge suffering from typhoid and polluting the water close to the intakes, and one pollution there would be more dangerous than a greater pollution higher up. He had seen manure barges pumping bilge water into the river and manure heaps drained by trenches. The manure which he described as contaminated contained fœtal calves, entrails of fish, the sweepings of slaughter-houses, contents of house dust-bins, old beds and bedding, rags and clothes, straw and cinders. The higher land of the district was adapted to sewage-farms, and farm treatment was the best for sewage. Generally speaking there was plenty of available land. The valley of the Lea is not served by the New River Company; they absolutely refused to supply any of the villages on its course. All the water used locally is raised locally from wells in the chalk and otherwise.

Death Rates and Water Supply.

Mr. Shirley Foster Murphy, Medical Officer of Health of the County of London, submitted tables which had been prepared to enable comparisons to be made between the enteric fever death-rates of London and some other towns; also between the rates of London districts having the same water supply; and also between London populations having different water supplies. The London death-rate, he said, bears favourable comparison with the rate in other towns having public water supplies which are not excrementally polluted. The following are such towns, and they are arranged in the order of the average annual enteric fever death-rate for ten years, 1881—1890, per 10,000 population. There are fourteen names, besides that of London, which stands eleventh on the list:—

Portsmouth	4·9	Hull	2·5
Blackburn	4·1	Birkenhead	2·1
Preston	3·8	London	1·9
Salford	3·8	Brighton	1·8
Nottingham	2·9	Bradford	1·7
Cardiff	2·8	Bristol	1·5
Derby	2·6	Huddersfield	1·5
Liverpool	2·6		

A second table gives for thirty-nine districts of the Metropolis the death rates from enteric fever, diarrhœa, scarlet fever, measles, diphtheria, and all causes, and also the infant mortality. The names are arranged in the order of the death rates per 10,000 from enteric fever. The rates range from 2·17 in Limehouse to 0·66 in Plumstead.

A third table shows that there are consider-

*See last volume of the *Builder*, pp. 418, 435, 456, 480, 503; and current volume, pp. 10, 29, 47.

able differences between districts having the same water supply.

Then the districts are grouped under their respective sources of supply; and the enteric fever death-rate per million for 1885—1890 was as follows:—

Kent	113·4	New River	107·74
Thames	128·9	New River and East London	118·79
Kent and Thames	136·7	East London	128·26
New River & Thames	142·2		

The inference he would draw from the table was that the test was favourable, so far as it went, to the wholesomeness of London water as compared with that of other towns.

The figures appear to show that the water of the River Lea has been more capable than any other of causing enteric fever, and that the water supplied by the East London Company has been more injurious than that supplied by the New River Company.

Tables are added to show the relative prevalence of other zymotic diseases, some of which are not believed to be communicated by water, viz., diarrhœa, scarlet fever, diphtheria, and measles. The tables show broadly that the tendency to prevalence of each of these diseases has been greater in the populations supplied by the Lea than in the populations having other water supplies, and that the order of incidence observable in the case of enteric fever is not maintained by the other diseases. Nor has the precise order been maintained by enteric fever in each of the six years under consideration.

Of nineteen districts receiving water from the Lea, the following numbers had higher mortality than the rest of London:—13 from enteric fever, 9 from diarrhœa, 11 from scarlet fever, 10 from measles, and 9 from diphtheria. Of 20 districts not receiving water from the Lea, 4 had higher mortality than London from enteric fever, 7 from diarrhœa, 8 from scarlet fever, and 7 from diphtheria. This table, however, it was explained, was subject to qualifications, and it was only the beginning of a further inquiry. There are more causes than one at work in London producing enteric fever, and one problem is whether any cause has tended to raise the amount of fever above an average. There is no evidence that the water of London produces typhoid fever. If certain districts suffer more than others from enteric fever and more from other diseases at the same time, one is disposed to look at conditions in those districts which are not related to water-supply as the probable cause. Various local conditions outside water-supply may affect the prevalence of enteric fever in the towns with which London is compared. Salford, for instance, which stands high in the list for enteric fever, is surrounded by the Irwell, which is little better than a polluted sewer.

The Water Examiner's Account.

Dr. Frankland's statement embodied the following facts and opinions:—The River Thames receives, above the intakes, contributions of organic matter of animal origin,—"generally innocuous, although sentimentally objectionable." It may, however, be accompanied by zymotic poisons,—typhoid fever, tuberculosis, or diphtheria. The risk is reduced by filtration, and by avoidance of flood waters. Still there is no "trustworthy guarantee" that the noxious matters are wholly removed. In ordinary weather a "considerable," and, in flood time, a "large" proportion of soluble organic matter makes its way down to the intakes. No company has sufficient storage to exclude flood-water altogether: the Grand Junction has only 3·5, and the Southwark 2·7 days' storage. The surface gravel supplies must be abandoned as population increases in the valleys. Notwithstanding the efforts of the Conservancy, analyses show that the water of the river is worse than in 1873,—that it contains 19 per cent. more of organic carbon, 13 per cent. more of organic nitrogen; but the water delivered in 1890 was 32 per cent. better than in 1868,—it was not so in 1891, which was a bad year for the operations of the companies. The improvement is both in matters in solution and matters in suspension. The filtration is better than in 1873. Still, the brightest and clearest water is not free from suspended matter. A ray of strong light shows it to be muddy, and a cubic inch has been found to contain many hundreds, and even thousands, of living organisms. On March 26, 1891, a cubic inch contained 25,912 living organisms. The water is "generally wholesome," but it is uncertain how far cases of zymotic disease are traceable to it. There is no positive evidence that the filtered water is unwholesome, but we ought not to be dependent upon the efficient filtering plant of commercial companies. An epidemic of typhoid or cholera above the intakes would be attended with great risk to Londoners. The belief that water from between bridges was safe cost 25,000 lives in 1849 and 1854. Theoretically, storage and filtration may be a considerable safeguard, but there is not a tittle of trustworthy evidence of that. The outbreak of typhoid fever at Lausanne, in Switzerland, where 17 per cent. of the population were attacked, showed that infected water was potent to produce disease even after filtration. Normally safe water liable to zymotic pollution ought to be avoided where the lives of millions may be jeopardised. Therefore the Thames ought to be abandoned as soon as practicable. This opinion, expressed in 1874, the witness still held, notwithstanding improved storage and filtration. Even if filtration intercepts all germs, this one line of defence ought not to be trusted. At the intakes, the water almost always contains an enormous number of living microbes,—in extreme cases half a million in a cubic inch; on the average of six weeks, over a quarter of a million. In the six weeks storage and filtration effected a reduction as large as 98·5 per cent., and the average reduction of the five companies was 30 per cent.

The Kent Company's water is unaffected by weather, and is always clear and bright without filtration. The sole defect of this water is its hardness. It contains fewer microbes than the river waters "as delivered," but what they contain "immediately after filtration" he is investigating. The vast majority of these microbes found in potable waters are harmless; it is rarely that pathogenic bacteria are found—never in any water supplied to London; but it must not be concluded that they are never present. Only half a cubic centimètre of water can be examined. Several pathogenic organisms can be cultivated only in the bodies of animals; and they are therefore undiscoverable by Koch's gelatine plate process. A single glass of water might contain two or three typhoid germs, and yet it would be by the merest chance that one of them would be in the small quantity selected for bacteriological examination. These examinations are simply a quantitative test of the filtration; they prove in the case of London how efficient as a rule is the sand filtration; but the large reduction of even 98 per cent. is by no means an absolute guarantee that pathogenic organisms, if present, would disappear with the crowd. It is only, so far as we know, by the rejection for dietetic purposes of water so polluted, that immunity from water-borne zymotic poisons can be secured.

The deep well water of the Colne Valley Company and the Tottenham Local Board are similar to the Kent Company's as regards organic purity; but they are softer—Tottenham by 5 degrees and Colne Valley by 20; but the Tottenham is delivered in its natural condition, and the Colne Valley is softened by Clark's process. The temperature of these well waters is nearly uniform throughout the year—far removed from freezing point in winter, refreshingly cool in summer.

We must break off here this week, although we have not yet finished Dr. Frankland's statement, the remainder of which is deferred for want of space.

The Commissioners held a sitting on Wednesday, chiefly for the purpose of receiving supplementary details from the representatives of the Companies.

TRADE FESTIVITY.—On Saturday last the employés of Messrs. Vaughan & Brown, Kirby-street, and Farringdon-road, gas engineers, &c., had their annual outing. Accompanied by Mr. Vaughan, Mr. Geo. Vaughan, and the heads of departments, they formed a numerous party, and were accommodated with special carriages attached to the nine o'clock train from Waterloo, whence they proceeded to Horsley. At Horsley a number of brakes were in waiting to convey them to Ripley, Surrey, where, after a cricket match on the village green, dinner was served in a large marquée erected in the grounds of the "White Hart" Hotel. After dinner, groups of the party were formed to explore the surrounding country, some on foot, some in carriages, all meeting again about eight o'clock, when the brakes were again in readiness to convey them to Horsley, where in due course the train arrived, the carriages filled, and with South-Western punctuality reached Waterloo soon after ten o'clock.

COMPETITIONS.

QUARANTINE HOSPITAL, CAPE TOWN, SOUTH AFRICA.—We are informed that the Municipality of Cape Town have awarded the premium for the best design of a Quarantine Hospital for Infectious Diseases to Mr. Wm. Hy. Reid, architect, of that city, and formerly of Plymouth, Co. Devon, and London, England. The cost is estimated by Government at 13,000*l.*

NEW SUNDAY SCHOOLS, JOHN-STREET CHAPEL, BEDFORD-ROW, W.C.—At a meeting of the School Trustees, held on the 18th inst., the design submitted in this competition by Mr. F. T. W. Goldsmith, of 1, Verulam-buidings, Gray's Inn, W.C., marked "Robert Raikes," was selected; and a premium of 5*l.* 5s. was awarded to Messrs. Keene & Drake, of 41, Bedford-row, whose design, marked "Experience," was placed second in the competition.

WOMBWELL BOARD SCHOOLS. — Seventeen sets of designs were sent in in this competition, and reduced by the Board to four sets, which were submitted to Mr. Innocent, architect, Sheffield. His report was in favour of Messrs. Butterworth & Duncan, Rochdale, who have been appointed architects by the Board.

BOARD SCHOOL, NEWPORT, MONMOUTHSHIRE.—An extraordinary meeting of the Newport School Board was held on the 18th inst. at the offices of the Board, Temperance-hall, Newport, to consider the plans submitted for a new school to be erected in Durham-road (Caerleon-road). The Sites and Buildings Committee reported in favour of two sets of plans, viz., that of Mr. Alfred Swash and Messrs. Lawrence & Fox, and requested the Board to make a selection from them.—Mr. T. H. Mordey proposed the adoption of the plans of Mr. Alfred Swash. This was seconded by the Rev. O. D. Campbell.—Mr. W. Clifford Phillips proposed that Messrs. Lawrence & Fox's plans be accepted.—On being put to the vote, the designs of Mr. Alfred Swash were accepted by six votes as against four given for those of Messrs. Lawrence & Fox.—The school intended to be built is one for three departments, viz., infants, boys, and girls. An acre of land has been purchased from the Clytha Estate for £1,000. Accommodation will be provided for 700 children in all, viz., 300 infants, 200 boys, and 200 girls. The estimated cost of building is £3,700.

ENGINEERING SOCIETIES.

SOCIETY OF ENGINEERS.—On July 20 a visit was paid by the Society of Engineers to the A. B. C. Sewage Works, Kingston; the Southwark and Vauxhall Water Co.'s Works, Hampton; and Messrs. Willans & Robinson's Works, Thames Ditton, four-horse coaches being engaged for the conveyance of the party. The Kingston Sewage Works have been constructed for treating, by the Native Guano Company's processes, the sewage of 35,000 people, but with certain comparatively inexpensive additions it is said that they will meet the requirements of a population of 50,000. At present the sewage being treated is that of a population of 39,487, including Surbiton and Hampton Wick.——The Southwark and Vauxhall Water Company's Works at Hampton were commenced in accordance with the provisions of the Metropolis Water Act, 1852, the first supply being pumped from Hampton to Battersea, to be there filtered and distributed, on July 5, 1855. In 1867 additional works were commenced on the adjoining land, having for their principal object the supply of the western portion of the district, these were completed and taken into use in the spring of 1870.——Messrs. Willans & Robinson's Works at Thames Ditton were started in the year 1881 for the construction of steam launches and yachts, and for the manufacture of the marine form of the Willans Engine.

LIVERPOOL ENGINEERING SOCIETY.—The Liverpool Engineering Society visited, on the 16th inst., the Fryer's Refuse Destructor, erected by the Corporation at their wharves in Chisenhale-street. Mr. H. P. Boulnois, City Engineer, conducted the party over the premises and wharves. The destructor, which was formally opened in October, 1891, although it had been more or less in use for some little time previously, consumes 600 tons of refuse per week. During the visit Mr. Boulnois explained to the visitors a new arrangement he had introduced for tipping the refuse into the furnaces without the labour of shovelling. By this contrivance the stuff is tipped into a tank divided into compartments, this tank being wheeled by mechanical means

over the furnace openings, and its contents dropped through the bottom.——Subsequently the members visited the works of the Liverpool Cold Storage and Ice Company in Williamson-square, and inspected, under the direction of Mr. M. C. Bannister, A.M.I.C.E., manager, a number of processes of refrigeration.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday afternoon last at Spring-gardens, the Chairman, Mr. John Hutton, presiding.

Election of Vice-Chairman.—Two candidates were proposed for the office of Vice-Chairman, vacant by the election of Mr. Hutton as Chairman. The two candidates proposed were Mr. Charles Harrison and Mr. Fardell. Mr. Harrison was elected, on a division, by a large majority, *i.e.*, by 71 for to 28 against.

The Adjournment for the Summer Recess.—On the motion of Dr. Collins, it was resolved

"That the Council at its rising on Tuesday, July 26, do stand adjourned for the summer recess until Tuesday, September 27, and that no Committee do meet after the date of the Council's adjournment until Monday, September 19, unless in a case of urgency which will, in the opinion of the Chairman of the Committee, not admit of delay; provided that the Chairman of the Council may convene a meeting of the Council during the recess if he deem it necessary to do so."

The Proposed New Street from Holborn to the Strand.—Mr. Frederic Harrison, Chairman of the Improvements Committee, proposed the adoption of the Improvement Committee's report on this subject. We gave, a fortnight ago, the substance of this report, together with a plan of the proposed street.

Mr. Ranyard moved, as an amendment:—

"That in the opinion of the Council, the proposed new street from Holborn to the Strand should follow the line recommended in the report submitted to the Council by the Improvements Committee on July 24, 1891,* namely, beginning from the Holborn end of Little Queen-street and trending westward; and that, subject to this alteration, the recommendation be adopted."

Mr. Farquhar seconded the amendment, which was rejected by a large majority, and the continuation of the debate was adjourned to a special meeting to be held this Friday, June 22.

Southern Approach to Tower Bridge.—The Improvements Committee also submitted proposals for forming a southern approach to the new Tower Bridge, but the consideration of this part of their report was also adjourned.

Vauxhall Bridge.—The Bridges Committee brought up a report recommending the rebuilding of Vauxhall Bridge, but the consideration of this, too, was adjourned.

Bars and Gates.—On the recommendation of the Highways Committee, it was referred to the Parliamentary Committee to prepare a Bill giving the Council power to remove a large number of bars and gates.

The London Water Supply.—The Special Water Committee brought up a report stating that in July last they accepted an offer by the Royal Society to make investigations into the question of the vitality of microscopic pathogenic organisms in water, and agreed to contribute a sum of 250*l.* towards the expenses of such investigation, a similar sum being contributed by the Government Grant Committee. They had recently received from the Royal Society a preliminary report on the subject, and this had been followed by a letter intimating that the amount granted by the Government and the Council would probably have been exhausted early in the ensuing winter, and that the Government Grant Committee had granted a further sum of 250*l.* provided that the Council saw its way to contribute a like sum. The Committee were of opinion, after giving the subject full consideration, that the Council should continue its assistance, but that it should be understood that the amount to be contributed is to be regarded as a final payment. With this proviso they recommended that the Council do contribute a further 250*l.* towards the expenses of the investigations now being carried on by the Royal Society.

In answer to Dr. Collins, it was stated that the investigations in question were in the hands of Dr. Percy Frankland and Professor Marshall Ward.

* We published the plan of this projected street in the *Builder* for July 25 last year.

The report, on the motion of Mr. Bassett Hopkins, was adopted, and

After discussing other matters the Council adjourned.

Correspondence.

To the Editor of THE BUILDER.

"CHANGES AT THE INSTITUTE."

SIR,—Mr. W. Pite's letter in your last issue makes it still more difficult to understand his drift, and that of those who act with him.

They cheered me when I repudiated the idea that an examination could be any test of a man's fitness to be an architect; and yet we find Mr. Pite, immediately after, asking that the Examination shall contain some test, and that of a competitive character, of a man's artistic talent.

Now, if it be impossible to test a man's power of applying the rules of construction, hygiene, and other branches that are more or less of the nature of exact sciences, how on earth can we test a man's artistic capacity? And who is to be the judge? Surely Mr. Pite and his friends will not maintain that the power of making a good paper design necessarily involves the power of carrying out properly a good and artistic building?

There is one way, and one only, of treating examination in art, and that is by insuring that the student has a close and intimate knowledge of old work. It may be possible to stimulate to further exertion by a judicious system of prizes, but no one will, I should think, assert that prize-winning is any test of a good architect.

The party who are moving in the matter do not seem to have made up their minds what they want. At one time they are against all examinations and diplomas, and the next strenuously endeavouring to establish a strict diploma in art, in which, above all things, diplomas have ever proved valueless. At any rate we may fairly challenge them to let us know precisely what they do mean.

RALPH NEVILL, F.S.A.

The Students' Column.

CONCRETE.—IV.

HYDRAULIC LIMES (*continued*).—STORING.

ALL limes and cements have a tendency to absorb moisture, and if they are left too long in a damp atmosphere, they will be entirely spoilt. As we have already seen in the case of rich limes, moisture causes the hydration of the lime, converting the quicklime (calcic oxide) into calcic hydrate, the latter having two or three times the bulk of the former. The same action takes place in hydraulic limes, but not to so great an extent. For this reason, however, manufacturers frequently warn their customers that, if any ground lime be not used at once it should be emptied out of the bags, as otherwise the expansion of the lime would probably burst them. The lime can be stored either in casks or on a dry floor in a warehouse, and may then be kept for some weeks, or even months, without detriment. This air-slaking causes the lime to set more slowly than when fresh, and this is frequently an advantage. For works in running water, where rapidity of set is necessary, ground lime is often used fresh.

Uses.—Hydraulic lime cannot, of course, be used for as many purposes as Portland cement. No one would think of using it now for the surface of paving, for floors, sewers, moulded work, or artificial stone; but it is largely used for concrete in ordinary foundations, and for mortar; it has also been employed successfully for concrete in the walls of buildings, but, in England at any rate, it is now superseded for that purpose by Portland cement. Mixtures of lias lime and Portland cement have also been used for the matrix of concrete, the result being, of course, a stronger concrete than if the matrix had been entirely of lime. But in mixtures of this kind great care must be exercised that the lime is thoroughly slaked before the cement is added to it, as otherwise the concrete may "blow." We shall have more to say about mixtures of lime and cement hereafter.

SELENITIC LIMES OR CEMENTS.

History.—Selenitic lime or cement was first made and patented by General Scott about 1870, and a company was formed to carry on the manufacture of it. The patent expired some years ago, and selenitic lime is now made at many lime and cement works in various parts of the country, but especially from the lias lime in Warwickshire and Leicestershire.

Composition.—The invention consisted in the addition of a certain quantity of sulphate of lime to the natural lime. Sulphate of lime ($CaSO_4$) occurs naturally in various forms, as selenite, gypsum, and alabaster. It is from the first of these that selenitic lime received its name. Plaster of Paris is calcined gypsum, and Robinson's cement (to be mentioned hereafter) is calcined alabaster. Keene's, Martin's, and Parian cements also consist chiefly of sulphate of lime. But the point, in which selenitic lime differs from all these, is that the sulphate is present only in a small quantity, and does not form the bulk of the lime or cement. In fact, about 5 per cent. of plaster of Paris added to 95 per cent. of lime, converts it into a selenitic lime. The better the natural lime is, the better, it is said, will be the selenitic lime manufactured from it; that made from grey lime will be inferior to that made from blue lias lime. This statement is not confirmed by Mr. Grant's experiments already quoted. (Table II.).

Tensile Strength.—There can be no doubt that the process increases both the cohesive and adhesive strength of limes to a great extent, but Mr. Grant's tests* do not show as great an increase of strength as do those published by the Selenitic Company. Perhaps this is not to be wondered at. We have already (chapter iii.) given a table based on Mr. Grant's experiments, showing the tensile strength of different mortars, some of which were made from selenitic lime. The experiments go to prove that, at the end of twelve months, a mortar composed of one part of selenitic lime and five parts of sand is equal in tensile strength to a mortar composed of the same lime (but without plaster of Paris) and three parts of sand. Selenitic treatment improved the grey lime 100 per cent. when kept in air and 109 per cent. when kept in water, but improved the lias lime (No. 2) only 57 per cent. in air and 66 per cent. in water, but the strength of the latter lime when made into mortar with six parts of sand was about 25 per cent. more than a similar mortar made from the former.

Adhesive strength.—We have already said that the selenitic treatment improves the adhesive strength of limes. The following table, in proof of this, has been compiled from the circular issued by the Selenitic Cement Company. It shows the force per square inch of mortar-joint required to tear apart bricks after they had been united for twenty-eight days by mortars of various kinds:—

TABLE V.

Adhesive Strength of Selenitic Limes, &c.

Kind of Lime or Cement.	Proportions of Lime or Cement and Sand.			
	1 to 3	1 to 4	1 to 5	1 to 6
	lbs.	lbs.	lbs.	lbs.
White Chalk Lime.....	43½	—	—	—
,, ,, Selenitic	101½	93¾	121¼	103¾
Barrow Lias Lime	9	6¾	—	—
,, ,, Selenitic	27	21	20	20
Portland Cement	—	23	16¼	15½

Compressive Strength.—The series of experiments made by Mr. Grant, and already mentioned, shows that concrete made of selenitic grey lime, gravel, and sand is 71 per cent. stronger than a similar mixture of ordinary grey lime, gravel, and sand, and that the selenitic treatment increases the strength of lias lime concrete about 38 per cent. These figures are the average of thirty tests of 6-in. cubes in each case. But the strongest selenitic lime tested by Mr. Grant, namely, selenitic Rugby lias, gave results far below those given by Portland cement, tested in the same manner. The resistance to crushing of 6-in. cubes of concrete, made from one part of selenitic Rugby lias and six parts of gravel and sand, was 9·28 tons, while similar cubes of Portland cement concrete crushed at 25·19 tons.

Storing.—Like all other limes and cements it should be kept perfectly dry, if not used fresh.

Uses.—Selenitic lime is used in mortar and concrete, but opinions differ as to the value of the treatment. Certainly engineers do not use

* "Proceedings of the Institution of Civil Engineers," vol. lxii. (1879-80), part iv.

it in very important works, but prefer Portland cement. A series of experiments, made by Mr. E. C. Clarke in connexion with the Boston Main Drainage Works (1878-84), convinced him that selenitic treatment "had not improved the cement sufficiently to compensate for the increased cost." The late G. E. Street, R.A., used selenitic lime in the concrete foundations, &c., of the Law Courts, after its value had been demonstrated by a series of experiments carried out by one of his clerks of works, and it was used in several other important buildings about the same time. It is more frequently adopted for plastering than for concrete, and has been used in that manner for many large works, including the Law Courts and the Manchester Town-hall.

GENERAL BUILDING NEWS.

NEW GUILDHALL, GLOUCESTER. — On the 12th inst. the new Guildhall, erected in Eastgate-street, Gloucester, was opened. At the opening ceremony Mr. G. H. Hunt, of London, the architect, read a description of the building, from which we take the following:—The various offices requisite for the working of the Corporation business are all placed on the ground floor for facility of access. The Council-chamber, committee-rooms, Mayor's parlour, and public hall are placed upon the first floor, so that they may be used separately or together according to requirements, without interfering with the offices on the ground floor. Additional offices, caretaker's quarters, and kitchens are on the second floor, and rooms for office purposes, storage, and cellars are provided in the basement. Retiring rooms and lavatory accommodation are arranged on the various floors. The Council-chamber, on the first floor, is arranged in a central position, and has a carved and panelled ceiling. The hall (40 ft. by 80 ft.), placed next New Inn-lane, occupies the whole width of the site. The main front of the exterior next Eastgate-street, is executed in Monk's Park stone, and is designed in the Renaissance style, somewhat severe in treatment. The other fronts, towards New Inn-lane and the courtyard, are executed in brickwork with stone strings and cornices, and kept quite plain. In the interior, polished Hopton Wood stone has been largely used for the columns, mantelpiece, and balustrading; the joinery generally is in oak, vitreous mosaic paving has been used in the hall, and the whole of the floors throughout are fireproof. Fibrous plaster has been freely used for the purpose of decorating the Council-chamber and gallery, public hall, and entrance hall ceilings. The heating and ventilation was carried out by the late Mr. W. W. Phipson. The scheme adopted is "low pressure steam" divided into circuits, combined with direct supplies of fresh air admitted vertically and also through radiators. The extraction of vitiated air from the public hall and Council-chamber is by means of ventilating sun-burners, and in the offices by means of air-flues. The works generally have been carried out by Messrs. Bowers & Co., of Hereford, the contractors. Messrs. Dennet & Ingle were the contractors for the fireproof flooring; Jackson & Sons, fibrous plaster work; C. Smith & Sons, locks, door, and window furniture; Rust, vitreous mosaic flooring; Smith & Stevens, lifts; Strode & Co., gas-mains and sun-burners; the late W. W. Phipson, heating apparatus; Pomeroy, cooking apparatus and gas-stoves; Frith, sculpture and carving; Conway Jones, general painting and decoration; Sessions & Sons, lavatory and sanitary fittings; Beaven & Co., gas-fittings and duresco decoration. Mr. Robert Griggs, of London, was the quantity and measuring surveyor; and Mr. F. Feltham has acted as clerk of the works. We gave a view and two plans of the building in the *Builder* for July 13, 1889.

CHURCH INSTITUTE, WOLVERHAMPTON. — The foundation-stone of an institute in connexion with St. Peter's Church, Wolverhampton, was laid on the 18th inst., by Lady Hickman. The structure, when completed, will be of two stories, containing on the ground-floor two class-rooms, over which will be placed one large room for meetings. A large committee-room and a smaller room will be on the upper floor. Another room for gymnastics will be placed behind the main block. The buildings will be of red brick with Codsall stone dressings. The cost of the portion now being erected will be 2,500*l.*, exclusive of the fittings and furnishing. The contractor is Mr. W. H. Lovatt, and the architect Mr. T. H. Fleeming, both of Wolverhampton.

FREE CHURCH, ST. ABB'S, BERWICK.—A new Free church was opened at St. Abb's, Berwickshire, on the 15th inst., by the Rev. Principal Rainy, Edinburgh. The building will accommodate about 390 persons, and has cost over 2,000*l.* The church, which is constructed of Swinton stone, is oblong in plan, with a square belfry at the eastern end (under which is the main entrance), and a vestry at the opposite or western end. The roof is of open timber, and all the pews and interior furnishings are of varnished pitch-pine. The windows are filled in with antique cathedral glass, and at the western end of the building, over the pulpit, is an ornamental rose window of stained glass. At this end of the church there is also displayed a mural bronze tablet, set in a black marble border, which the inhabitants of St. Abb's have erected to the memory of Mr. Howard Graham Usher, the deceased son of the donor. The building is lighted entirely by electricity, connexion having been established with the electric power which supplies the mansion-house of Northfield. The architect was Mr. J. L. Murray, of Biggar.

BATHS, BURSLEM. — On the 14th inst., Mr. Rienzi Walton, M.Inst.C.E., an inspector under the Local Government Board, held an inqulry in reference to an application by the Corporation to borrow 9,000*l.* for public baths, 5,000*l.* for the purchase of about twenty-two acres of land to be laid out as a park and recreation ground, 3,750*l.* for public improvements, and 1,600*l.* for sewage purposes. The Borough Surveyor, Mr. F. Bettany, described the various works. There was no opposition.

TECHNICAL SCHOOL, HOLMFIRTH, YORKSHIRE.—On the 16th inst., the foundation-stones of a new Technical School for Holmfirth were laid. The estimated cost of the new building is about 3,000*l.*, and it is being erected from plans prepared by Mr. Joseph Smith, Holmfirth and Sheffield, who gained the first premium in the competition promoted by the Building Committee. It will be in the Elizabethan style.

TEMPORARY SANATORIUM, CARDIFF. — On the 19th inst. a temporary sanatorium was opened at Cardiff by Alderman T. W. Jacobs. The sanatorium is designed to provide accommodation for cases of infectious diseases pending the erection of the complete sanatorium, to which it will afterwards form a supplemental pavilion. It is erected on a portion of the site procured for the permanent building on the Moors, between the Penarth branch of the Taff Vale Railway and the Ely river, and provides for the accommodation of twenty-four patients. The buildings, which are of timber framing covered with corrugated iron over a layer of felt, and lined with match-boarding, are raised to a height of about 5 ft. above the general level of the site, on a foundation of brickwork. The main ward pavilion, which is a one-story building, consists of a central administration block, containing matron's sitting-room, bedroom, kitchen, scullery, and stores, the matron's rooms being divided from the kitchen department by a corridor communicating with the main corridor connecting the wards, on the opposite side of which are the nurses' bedrooms and sitting-rooms. The two wards which terminate the main corridor are for males and females respectively, and each provides accommodation for twelve patients. They are 60 ft. long by 20 ft. wide, and are 16 ft. high to the ridge, and are heated by two Gill stoves in each ward, with flues carried beneath the floors to the outside of the building. The ventilation is secured by means of fresh air inlets underneath each ward bed and a ventilated ridge running the whole length of the wards, in addition to which cross ventilation can be obtained from the fanlights of the windows and lantern lights, all of which are made to open. At the end of each ward is a bath-room. Opposite the entrance to the site is situated the laundry block. The brick foundation, earthwork, and the whole of the plumbing and sanitary arrangements have been carried out by corporation workmen. The corrugated iron superstructures were supplied and erected by Messrs. Humphreys, Limited, of London; the ward and other stoves, &c., by Mr. John Williams. The planning and disposition of the various blocks, and the engineering, drainage, and sanitary matters generally, have been carried out by the Borough Engineer, Mr. W. Harpur.

ST. PETER'S NEW SCHOOLS, WORCESTER.—On the 15th inst., the Bishop of Worcester opened the new St. Peter's schools, which have been erected in Severn-street, Worcester. The site upon which the new buildings are erected was given to the parish by the Royal Porcelain Works Company. The new buildings adjoin the old schools, and are constructed with red bricks and roofed with tiles. The ground floor comprises a boys' school, 60 ft. by 32 ft., and 16 ft. high, an entrance corridor, lavatory, cloak lobby, and master's room. The old boy's school will be converted into three class-rooms, which will communicate with the new room by a corridor. Accommodation is provided for 204 boys in the school-room, and 152 in the class-rooms. The floor of the new school-room is composed of wooden blocks, laid in a pattern upon a foundation of concrete. The first floor, immediately above the boys' department, comprises a girls' school, 68 ft. 9 in., by 32 ft., and 19 ft. high, a lavatory, cloak-rooms, and front and back staircases, while the old school-room adjoining is converted into three class-rooms. The infants' school is at the rear. The whole of the new schools and class-rooms are heated with hot water, the apparatus for this, and also the gas-pipes and fittings, having been supplied and fixed by Messrs. J. Ward & Sons, of Worcester. The contract price for the schools was 2,211*l.*, and the work has been carried out by Messrs. J. S. Wood & Sons. The architects were Messrs. Yeates & Jones, of Worcester.

SANITARY AND ENGINEERING NEWS.

THE WATER SUPPLY OF CROMER.—The Cromer Waterworks Company, in view of the growing popularity of the town, have been engaged during the past two years in sinking a second well capable of giving a supply considerably in excess of that hitherto available. These wells are situated more than half a mile outside of the town. Owing to the sandy character of the upper strata, great difficulty was experienced in sinking the new well, which varies from 8 ft. to 5 ft. in diameter, and has been carried to a depth of 183 ft. from the surface. The chalk was reached at a depth of 138 ft. below the surface, and, with the object of ensuring the purity of the supply by excluding all percolations from the strata above, the well has been lined to a depth of 151 ft. with brickwork and iron cylinders. The new bore-hole, which is 20 in. diameter, extends from the bottom of the well for a further depth of 40 ft. Two headings, each 6 ft. by 4 ft., have been driven for a distance of 100 ft., one serving as a connecting link between the new well and the old bore-hole, by means of which the town has hitherto been supplied. The permanent water level in the new well and old bore-hole is 110 ft. from the surface, and, as already stated, all the water flows direct from the chalk. The well, with the headings, possesses a storage capacity of 25,000 gallons, and the total yield, when the works are in full operation, will be at least 200,000 gallons a day, a supply that will suffice for the requirements of the town for many years to come, even at the present rate of progress. A new set of pumps and engine have been erected, designed to lift 12,000 gallons per hour, and the entire system is now in duplicate, so that in the event of a breakdown,—an eventuality by no means likely to happen,—a failure in the supply will, practically speaking, be an absolute impossibility. The water has recently been examined by Professor Frankland, F.R.S., the well-known water analyst, and he reports on samples taken from each well as follows:—"The two samples are of most excellent quality for dietetic purposes. They are absolutely free from all evidence of previous sewage or animal contamination, whilst for chalk water they are of very moderate hardness. Cromer may be congratulated on being supplied with one of the best waters in Great Britain." The works have been carried out, under the direction of Mr. J. C. Melliss, of London, by Messrs. Thomas Tilley & Sons, of Walbrook, London, the pumps and machinery being supplied by Messrs. Robert Warner & Sons, of Walton-on-the-Naze, while the buildings at the surface have been erected by Mr. John Newman, of Cromer.

PONTYPRIDD JOINT SEWERAGE SCHEME.—The last brick of the Ystradyfodwg and Pontypridd joint sewer was laid on the 30th ult., at Nantgarw, by Mr. D. Leyshon, chairman of the Pontypridd Local Board. The scheme had cost 150,000*l.* The length of the sewer is 18 miles. The section of the sewer varies from 3 ft. 4 in. by 2 ft. 8 in. to 5 ft. 6 in. by $\frac{3}{8}$ in., the syphons under the river being 2 ft. 9 in. There has been 3½ miles of tunnelling, the average depth is 15 ft., and three different valleys have been traversed. The contractors were Messrs. W. R. Parker & Co., of Cardiff. The engineer was Mr. Chatterton, and the resident engineer was Mr. Hellins.

SANITARY BY-LAWS, CARDIFF.—At the monthly meeting of the Cardiff Rural Sanitary Authority on the 13th inst., the Building By-laws for the whole of the district of the Authority, as amended by the Local Government Board, were agreed to. The by-laws for the regulation of slaughter-houses in certain parts of the district were also approved. The Surveyor of the Authority, Mr. Wm. Fraser, Assoc.M.Inst.C.E., &c., presented plans for the drainage of Ely, at a cost of 1,000*l.*, the consideration of which was referred to a sub-committee.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOW, IRON ACTON CHURCH, GLOUCESTERSHIRE.—The window which has been placed in Iron Acton church, to the memory of the late Captain Liddon, was dedicated on the 2nd inst. The subject of the window is "The Call of St. Matthew," and the design was furnished and executed by the firm of Messrs. Joseph Bell & Sons, Bristol.

ST. MARY'S CHURCH, SHREWSBURY.—The fine church of St. Mary, Shrewsbury, has just received various embellishments in the chancel. An entirely new floor has been laid with encaustic tiles and polished Anglesey marble steps. The tiling is by Messrs. Godwin & Son, of Lugwardine Works, Withington, Hereford, who have used their well-known "Antique" encaustic tiles with great success, the whole being of a pleasing and harmonious tone. A stone screen has been erected between the choir and the chancel, and wrought-iron grilles have been placed in the sanctuary arcade. The architect for the work was Mr. A. E. Lloyd Oswell, A.R.I.B.A., of Shrewsbury.

DECORATION OF THE LEEDS TOWN HALL.—The Corporate Property Committee of the Leeds Cor-

poration, at a special meeting on the 15th inst., again had under consideration the question of cleansing and decorating the Town Hall. Mr. Crace, of the firm of Messrs. Crace & Sons, London, attended with designs and estimates, amounting to 5,710*l.*, of which 2,590*l.* was in regard to the Victoria Hall. He said that it would be impossible to complete the work before the holding of the Triennial Festival. The committee adjourned on the understanding that a meeting would be convened to specially consider the estimates and designs submitted by Messrs. Crace & Sons, as well as those sent in by Messrs. Dobie & Sons, of Edinburgh.

FOREIGN AND COLONIAL.

FRANCE.—Monsieur Huillard, Honorary Architect to the City of Paris, and Monsieur Rigault, Architect of Civil Buildings, and a former winner of the second Grand Prix de Rome, have just been named Chevaliers of the Legion of Honour.——M. Cordonnier having obtained, in consequence of the new vote of the jury, the Medal of Honour for Architecture at the *Salon*, the first-class medal originally accorded to him has just been awarded, after a second ballot, to M. d'Espouy, who this year exhibited a "Restoration of the Basilica of Constantine at Rome," and "Recollections of Greece."——The architect students who have competed for the Grand Prix de Rome have just finished their examinations "*en loge*," and their works will be exhibited from July 29 to August 2. The award will be made on August 1.——The painter Rochegrosse has just finished the sketch of a rather large composition entitled "La Guerre," which he has been commissioned by the Government to execute for the National Manufactory at Sèvres.——It appears that the Municipal Council of Paris has rejected the project adopted by the military authorities for setting back as far as the Seine that part of the fortification wall which extends between Auteuil and St. Ouen. The Council demands the total suppression of the fortifications of Paris, whose defensive works should be taken outside the suburbs.——It is proposed to open at the Palais Bourbon, in April next, the first of a series of annual art exhibitions, the receipts being appropriated to the support of the museums.——On Sunday last was inaugurated the new Mairie of the Eighteenth Arrondissement, of which M. Varcollier is the architect.——There has also been recently inaugurated the new *Salle des Fêtes* which M. Vaudremer was commissioned to erect at the Mairie of the Fifteenth Arrondissement (Vaugirard). This fine hall is to be enriched by a marble bust of the Republic, from the chisel of M. Chaplain, Member of the Institut.——The Académie des Beaux-Arts has awarded a prize of 2,000 f. to MM. Porcher et Fournereau, architects, for their "*étude artistique*" of the monumental buildings of Khmer, in Siamese Cambodia.——The "Exposition des Arts de la Femme," organised by the Union Centrale des Arts Décoratifs, will be inaugurated on August 1 at the Palace of Industry.——There has just been inaugurated at St. Brieuc the monument erected to the Gardes Mobiles of the Côtes du Nord killed during the war of 1870. The monument is the work of M. Pierre Ogé.——On August 28 there will be inaugurated at Vallerangues (Gard) a statue of General Périer, executed by the sculptor Morice.——The inauguration of the monument to Le Sage at Vannes (Morbihan) is fixed for September 18 next.——A committee has been formed at Havre for erecting a monument to Admiral Mouchez, recently deceased. He was the Director of the Paris Observatory.——An art exhibition will be held at Fontainebleau from August 1 to September 30 following.——The Lorraine Society of the Friends of the Arts has fixed November 1 as the date of the opening of its twenty-ninth annual exhibition, which will be closed on December 8 following.——There has just been organised at the Champ de Mars, in the Palace of the Liberal Arts, an exhibition entitled the "Summer *Salon*," which includes a certain number of works already exhibited in this year's *Salon*. The exhibition is one possessing very little interest.——The new General Post Office at Tunis, erected by a French architect, has just been opened.——The Municipal Council of Paris intends to vote a credit of 200,000 fr. to defray the cost of the participation of various administrative services in the Chicago Exhibition.——On Sunday last the monument erected at Belfort to the memory of Dr. Fréry, Senator for the Haut-Rhin, was inaugurated.——On Sunday last, also, the Labour Exchange at Toulouse was opened.——The City of Paris has just acquired, for the Hôtel de Ville, a very fine portrait of M. Alphand, by M. Roll, which was exhibited in the Exposition Universelle of 1889.

BERLIN.—According to the *Centralblatt der Bauverwaltung*, a so-called "German House" is to be erected in the grounds of the Chicago World's Fair, the site on which it is to be placed being in close proximity to the English one. The building will contain not only the offices of the Imperial Commissioner and his executive committee, but also a suite of rooms for the convenience of German visitors to the Exhibition. The design shows a building of half-timber construction. The architect according to whose drawings the woodwork is being cut and framed is Herr Radke; the building will, however, be put up under the superintendence of Herr Fiedler, a German resident in Chicago.——The usual list of annual reports sent in by the technical *attachés* has been published, and we notice that last year Austria, Italy, Russia, France, and America have been considered as deserving of Government attention. England has again been without an *attaché*, and hence there are no reports on architectural or technical matters from that country. Of the 1,200 reports sent in during the last decade, the majority come from the American representatives. Last year's set of reports contains a very limited number relating to architecture proper; Italy and Russia head the list in regard to numbers.——The system of having technical *attachés* in the different embassies is now to be copied by Austria. The Austrian Government will send out two gentlemen, one to St. Petersburg and one to Washington, the selection of these two cities being due to the difficulties experienced in obtaining such authentic reports of technical importance as can be more easily had from other capitals.——The Emperor intends laying the foundation-stone of the Strasburg Garrison Church in the autumn. This building, which will have seats for 2,100 men, and standing-room for another thousand, is to cost 55,000*l.* The work was put up to competition, Herr L. Müller (Reg. Bm.), architect, being the successful competitor.——The Special Commission which has been called together to study the causes of the floods in German river valleys, to examine the present system of river regulation adopted in the Empire, and to make recommendations as to the best mode of preventing further catastrophes, has held its first meeting. This very important Commission was elected by command of the Emperor, who took the initiative, believing the present system of river regulation to be based on a wrong principle. The Rhine receiving separate treatment. This Commission will only examine the other rivers; commencing with the Oder, and then taking the Elbe, Vistula, Weser, &c.——The number of students at the Royal Technical College remains about the same as last term, *i.e.*, 1,830. Of 195 non-Germans, no less than ninety are Russians. There are four Englishmen.

LEIPSIC.—The biennial gathering of the Amalgamated Societies of Architects will be held at Leipsic on August 28, and will last three days. It will be preceded by a business meeting of the official delegates of the various societies, and there will be a final excursion to Dresden on September 1, on which day the new Semper monument is to be unveiled. The programme is an extensive one, including several interesting lectures, and much sightseeing and banqueting. Leipsic, which has made such rapid strides in the last decade, can well vie with Hamburg, where the last gathering was held, as far as interesting public buildings are concerned; whilst the business premises, town-houses, and villas will not bear comparison.

MISCELLANEOUS.

APPOINTMENT OF WATERWORKS ENGINEERS.—The Waterworks Committee of the Wolverthampton Corporation have considered 138 applications for the post of waterworks engineer, to undertake part of the duties formerly performed by Mr. Lyons Wright, and the names of three candidates were placed before the Town Council on Wednesday for their final selection. The candidates were:—Mr. W. Jones, of the Liverpool Corporation Waterworks; Mr. Thomas Raynes, the senior assistant to the Water Engineer of the Birmingham Waterworks; and Mr. E. A. B. Woodward, of the St. Helens Corporation Waterworks. A vote was taken, and in the result Mr. Woodward was elected. The salary offered is 250*l.* per annum.——We are informed that Mr. H. C. Marks, Assoc.-M.Inst.C.E., Borough Engineer and Surveyor of Dewsbury, has recently received two additional appointments, accompanied by a substantial increase of salary, viz., that of Water Engineer to the Dewsbury Corporation and Engineer to the Dewsbury and Heckmondwike Waterworks Board. This latter authority supplies water to the boroughs of Dewsbury, Ossett, and Barnsley, and the local board districts of Heckmondwike, Soothill Nether, Ravensthorpe, Skelmanthorpe, and Flockton.

BRISTOL MASTER BUILDERS' ASSOCIATION.—The annual excursion in connexion with this association took place on the 19th inst. The locality selected for the visit was Bath and Limpley Stoke, and the general arrangements were carried out by the secretary, Mr. H. J. Spear. Luncheon was provided at Limpley Stoke, after which the members returned to Bath, where some members of the Bath Master Builders' Association joined the party, and, acting as guides, visits were paid to the Abbey and the Roman Baths. A large company sat down to dinner. The chair was taken by the President, Mr. E. T. Hatherly, and the vice-chairs were filled by Mr. A. Krauss (vice-president) and Mr. G. Humphreys (treasurer). Mr. Galbraith gave "The Architects, Engineers, and Surveyors," which was acknowledged by Messrs. Scoones, Barratt, and Cloutman. Mr. W. H. Brown, in giving "The National Association of Master Builders," said he understood that the work of the National Association was to hear the grievances, and look after, as far as possible, the interests of the master builders in the country, and to keep the various provincial associations in touch one with the other. Mr. A. Krauss, who responded, said there could be no doubt of the excellent general work which the National Association was doing. The National Association, being in communication with all the provincial organisations, was a valuable fountain-head to go to for information regarding general trade matters. He trusted that before long there would be a National Confederation of Builders and Contractors. Mr. Hayward (Bath) proposed "The Bristol Master Builders' Association," which was replied to by Mr. E. T. Hatherly, who remarked that the Association had been doing an excellent work for more than a quarter of a century, and what it had been able to accomplish in the last four or five years was in itself a proof of the necessity of its existence. Other toasts followed. The return to Bristol was safely accomplished.

THE ALBERT PALACE, BATTERSEA.—No bid was made when, on April 27 last, the Palace was put up to auction at the Mart at an upset price of 5,000*l.* We now read that under a distraint for rent, the Office of Works will on the 27-8th instant sell all the effects, including the diving bell (formerly in the Polytechnic), the organ, and sundry building materials. The organ was built, from Mr. W. T. Best's design, by Messrs. Bryceson Bros., and was first set up in the house of Mr. Holmes, by Primrose-hill.

PROPERTIES FOR SALE.—At Dowell's Rooms, Edinburgh, on the 27th instant, Dunmore, Stirlingshire, extending over 4,000 acres, and yielding a net annual revenue of about 6,300*l.* The village, situated on the estate, in Airth parish, lies eight miles south-east from Stirling. Dunmore Castle was an ancient seat of the Murrays, who took thence their title of Earl, conferred upon Lord Charles Murray in 1686. Airth Castle (originally, we believe, a stronghold of Wallace) is illustrated in vol. ii. of Messrs. D. Macgibbon and Thos. Ross's work upon the Castellated and Domestic Architecture of Scotland (1887). Built in presumably the latter half of the sixteenth century, it is remarkable for presenting an example of, together, an open bartizan and its development, the conically roofed turret. Each of the two dormers of the east front has a tympanum with enriched moulding and ornament,—the one of lattice and star work, the other of fern foliage. At the Mart, on the 26th inst., Knole Park, Gloucestershire, together with six farms, covering 1,074 acres in all, midway between Thornbury and Bristol, and overlooking the Severn. Knole, in Almondsbury, is an ancient seat of the Chester family; the Almodesbury of the Conqueror's Survey belonged to Berkeley Manor, but in 1148 was given to the Abbey of St. Augustine, Bristol, by Robert Fitzharding, founder thereof. After the dissolution, Henry Darcy sold it, *temp.* Elizabeth, to Thomas Chester. The house stands within some old earth works attributed to Offa, King of Mercia, who, as some say, was buried at Over, in this parish. At the Mart, on the 19th inst., Hardres Court, near to Canterbury, with two farms (411½ acres), and, in two other lots, Cook's and Young's farms (312 acres jointly). This land belonged in 1080 to Odo, Bishop of Bayeux, at whose disgrace it devolved upon the Crown. It then passed from the Clares, Earls of Gloucester and Hertford, to a family who took its name. Thomas Hardres, *obiit* 1556, held it *in capite* by fee of a knight's service, of Tonbridge Castle, a seignory of the Clares. He was with Henry VIII. at the siege of Boulogne; for his good service there the King allowed him to bring away a set of gates from what is now known as the Haute Ville, which in Hasted's time were still preserved in the garden wall, over against the church of Hardres Court. And at Exeter, on the 28th and 29th inst., the Haldon Estate, seat of the Palk family, near to Exeter, which is to be offered in eighty lots, producing an aggregate rental estimated at 4,900*l.* per annum, and being nearly 4,130 acres in extent.

ELECTRIC LIGHTING OF THE ST. HELENS TOWN-HALL.—On the 18th inst. the work in connexion with the electric lighting of the St. Helens Town-hall was completed, and the current turned on. There are 339 lights, each one being of 16-candle power. In the engine-house there are two of Burnstead & Chandler's patent double cylinder silent engines, which couple direct to Holmes & Co.'s "Castle" dynamos, each of which produce about 200 lights. The fittings have been put in by Messrs. J. D. F. Andrews & Co., of London, under the superintendence of their electrical engineer, Mr. J. D. Bailie. The cost has been about 1,500*l.*

THE ENGLISH IRON TRADE.—With the close of the general election a steadier tone is observable in the English iron market, although transactions are still limited, and prices remain practically unchanged. In crude iron inquiries are a trifle more numerous, and in manufactured iron more business is reported. Tin-plates continue inactive, and in steel little is done outside ship-building material. Ship-builders and engineers are only moderately engaged, and in the coal trade a dull tone is reported.—*Iron.*

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENT.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premium.	Designs to be delivered.
*Infant School, Bexhill	Rev. E. Mortlock	10*l.*	Aug. 10
Intermediate School, Barry, Glam.	.....	.....	Aug. 15
*Drinking Fountain for Cattle, Dogs, &c.	Ossett Corp.	.....	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered
*Paving (Tar or Concrete) Works	Maidstone U.S.A.	W. G. Scoones	July 23
*Alterations, &c. to Workhouse	Petworth Union	H. Howard	July 25
Sewerage Work	Northwich Local Bd.	W. R. Stow	July 26
Additions to Premises, High-street, Ferndale, South Wales	Ferndale Indus. Co-op Soc.	Walter Jones	do.
Road Works, near Barnsley	Hoyland Nether L. B.	W. Farrington	do.
*Wood Paving Works	Westminster Vestry	G. R. W. Wheeler	July 27
Main Sewer Extension	Cardiff Corporation	W. Harpur	do.
Additions, &c. to Schools, Moseley	Wednesfield School Bd.	G. H. Stanger	do.
Bridge Works, Oldham and Manchester	Lancs. & Yorks. R. C.	*Official*	do.
Fitting-up Show Yard, Carlisle	Cumberland Agri. Show Committee	.....	do.
Sewerage Works, Edmondsley	Chester-le-Street U.S.A.	D. Balfour	July 28
Sewerage Works	Thornhill Local Board	J. C. Haller	do.
Wesleyan Chapel, Probus, Redruth	.....	Sampson Hill	do.
*New Buildings, &c. Rochester	School Governors	Nash & Bond	do.
*Brick and Pipe Sewers, &c.	St. Marylebone Vestry	*Official*	do.
*Sewerage Works	Cuckfield U.R.S.A.	W. Beach	July 29
*New College Buildings, &c. Bangor	North Wales Training College	R. Grierson	July 30
Additions, &c. to Vicarage, Llantillio, Crossenay, near Pontypool	.....	Halliday & Anderson	do.
Reservoir and other Waterworks, Fortrose, N.B.	Fortrose Town Council	*Official*	do.
Road Diversions and Improvements, Worksop Abbey	Duke of Newcastle	.....	do.

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Roadmaking Works	Southend Local Board	Peter Dodd	Aug. 2
Warehouses, Union Quay, North Shields	Tynemouth Corp.	J. F. Smillie	do.
School Buildings, Thomas-street	Sunderland Sch. Bd.	*Official*	do.
Additions to Asylum, Exminster	Devon County Council	E. H. Harbottle	do.
*Wrought-Iron Unclimbable Fencing	Hendon Loc. Bd.	S. S. Grimsley	do.
*Engine House, &c. &c.	Tottenham Local Bd.	J. E. Worth	do.
*Roadmaking Work	Lewisham Bd. of Wks	*Official*	do.
*Cottage and Office, Cartsheds, &c.	do.	do.	do.
*Small Public Hall, &c.	Winchester T. C.	J. B. Colson	Aug. 3
*Making-up and Paving Road	Fulham Vestry	W. Sykes	do.
Pipe Sewers	Ystradyfodwg (Glam.) Loc. Bd.	J. W. Jones	do.
*Pipe Sewers, &c. &c.	Hendon Loc. Bd.	S. S. Grimley	Aug. 4
Whinstone Road Metal	Cowpen Dist. L. B.	T. Maddison	Aug. 5
*Sea Defence Works	Worthing T. C.	R. B. Grantham & Son	Aug. 8
*Steam Boiler, Pipes, Heater, &c., for Laundry	Sevenoaks Union	T. Hennell	Aug. 9
Alterations and Additions to Workhouse	Llanelly Union Guar.	W. Griffiths	Aug. 10
*External Painting, Chatham Barracks	War Department	*Official*	No date.
*Chapel, Mill Hill	.....	Isitt & Adkin	do.
*New School, &c Abingdon	.....	J. G. T. West	do.
Five Shops and Houses, Armley, Leeds	.....	T. Howdill	do.
Three Houses, Bramley, Leeds	.....	F. W. Rhodes	do.
Two Houses, Burley, Leeds	.....	C. H. Thornton	do.
School Buildings, Sharrow-lane	Sheffield Sch. Bd.	C. J. Innocent	do.
School Buildings, Caldewgate, Carlisle	.....	G. D. Oliver	do.
South Porch, St. Lawrence Church, Gnosall, Stoke-upon-Trent	.....	C. Lynam	do.

PUBLIC APPOINTMENT.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Engineer, Architect, and Surveyor	Norwich Corp.	600*l.*	Aug. 16

Those marked with an Asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., & viii. *Public Appointment, p.* xviii.

PROPOSED IMPROVEMENTS, NEWPORT, MONMOUTHSHIRE.—Major-General Crozier, R.E., held an inquiry at the Town-hall, Newport, on the 14th inst., into an application to the Local Government Board on behalf of the Newport Corporation for leave to borrow a sum of 30,500*l.* for the improvement of the approach to Newport Bridge. The Town Clerk was present to support the application, and the Town Surveyor (Mr. Conyers Kirby) and Assistant-Surveyor (Mr. Haynes) to give evidence upon it. At the conclusion of the evidence the Commissioner stated that he would report to the Local Government Board. Major-General Crozier also inquired into an application made by the Corporation to borrow a sum of 12,000*l.*, proposed to be devoted to the laying out of the land for a public park given by Lord Tredegar.—The Town Clerk (Mr. A. A. Newman) explained the objects for which the loan was being raised. It was intended to fence the land and make a main road through it at once, and plant trees in the autumn. There would be separate contracts for that. Afterwards it was proposed to shape the land and to build the lodges and pavilions.—The Inspector said he was afraid the application was not fit yet for a loan, because the details of the proposed expenditure were not submitted to the Local Government Board. He suggested that the Town Clerk should get Mr. Mawson, the architect whose plans had been accepted, to supply details of the proposed expenditure, so that the whole cost might be before the board.

CAPITAL AND LABOUR.

THE LOCK-OUT IN THE BOLTON BUILDING TRADE.—The Bolton building trade lock-out has just been ended, and the men affected resumed work on the 19th inst. The lock-out took place a week before as the result of the plumbers' strike. The Master Builders and Operatives' Federation met on the 18th inst., and it was agreed that from November to January work shall commence on Monday at eight, and at seven on other mornings. The rule as to country money is referred to arbitration, Mr. Rowland Taylor, the Bolton coroner, being appointed umpire.

CARPENTERS' STRIKE AT BELFAST.—The carpenters and joiners of Belfast have gone out on strike for ½d. per hour increase of wages. A special delegates' meeting of the London carpenters and joiners was held at the headquarters of the society in Belvedere-road, South London, on the 16th inst. to consider what steps should be taken in support of the Belfast carpenters. After discussion, it was decided to make a levy that would realise at least 350*l.* per week. The following resolution was thereupon submitted and carried:—"That we earnestly request the members of the various societies represented in this country to levy themselves 8d. per week in support of the carpenters and joiners on strike in Belfast, such levy to be continued until the termination of the strike."

THE CARDIFF BUILDING TRADES DISPUTE.—It is reported that the master builders at Cardiff, having failed to get workmen from other parts of the country to come to Cardiff, have resolved to obtain workmen out of the country, and agents have been sent to Belgium and France for the purpose of obtaining workmen.

MEETINGS.

SATURDAY, JULY 23.

Architectural Association.—Visit to the new Lunatic Asylum erected by the London County Council at Claybury, Essex, by permission of the architect, Mr. G. T. Hine. Meet at Woodford Station, G.E.R., 3.7 p.m.

Incorporated Association of Municipal and County Engineers.—Annual Meeting, Bury, Lancashire (third day).

Sanitary Inspectors' Association.—General Meeting, when a Report upon the recent Visit of the Association to Paris will be presented. 7 p.m.

WEDNESDAY, JULY 27.

Surrey Archæological Society.—Visit to the Roman remains at Silchester.

FRIDAY, JULY 29.

Institute of Certified Carpenters (Carpenters' Hall).—7.30 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

11,102.—WINDOW-SASHES: *J. Parker.*—This patent refers to an improvement consisting in facing the middle or meeting-rails with hard wood in such a manner as to make it almost impossible to break or chip the edges or angles, also effectually preventing burglars opening the sash from the outside without breaking the window. It is also claimed to prevent all draughts entering the room, and that it becomes air-, dust-, and water-tight when closed. In the face of each middle or meeting rail a groove is made, either dovetailed, parallel, or other suitable shape and depth, the whole length of the rail, into which groove is fitted a piece of mahogany, oak, pitch pine, or other like wood of suitable thickness and half the width of the rail, the hard wood being set at right angles with each other in the two rails and running from end to end, thus forming a rabbet, so that when the two rails meet in position the hard wood forms a parallel face between the dead rails.

13,738.—TERRA-COTTA: *W. Schleuning.*—This invention refers to a process for producing imitation terra-cotta and ornamental stonewares, which consists in mixing powdered terra-cotta, clay, fire-brick, porcelain, and similar substances with burnt powdered gypsum, burnt slaked lime, and water to form a cement, then pressing or casting such cement into moulds, allowing it to harden, and finally treating the finished article with baryta water. The articles thus produced are said to be impervious to the effects of weather.

8,352.—BRICKS: *C. Borquer.*—This patent relates to the construction of bricks, with especial reference to fire-bricks for use in walls for lining metallurgical, glass, or boiler furnaces, but may also be applied to bricks for general purposes. The object is to produce a brick that will bind the course together, and that may be used to form a bond in any position the brick may be laid. The inventor produces a brick provided with projections arranged equi-distant and in a plurality of pairs on one side, and corresponding depressions on the opposite side; a brick provided with projections arranged in a plurality of longitudinal and transverse equi-distant pairs on one side, and corresponding depressions on the other side; and a brick provided with a plurality of pairs of projections arranged equi-distant longitudinally and transversely of the brick and one side of it, and grooves in the opposite side.

8,381.—HOUSE-DRAINS: *C. Behn.*—This invention relates to the drainage of houses, and consists in a system which can only be adequately understood by reference to the detailed specification and drawings, by which the inventor claims that not only is the outlet to the main sewer or to the cesspool closed by a water-seal, so that foul gases cannot pass to the house-drain from the sewer or cesspit, but a special arrangement is made to produce a suction up-current in the house-drain and soil-pipes, so that any gases occurring therein are carried off outside the house above the run, instead of being suffered to pass out unassisted with such tendency as their warmth, or other properties, may give to rise through the ventilating-pipes.

8,795.—ARCHES: *G. L. Moeckel.*—This invention consists in a novel arrangement of the arches for supporting ceilings and vaults, and the objects are to construct a vault of wide space and small height without the employment of supports, and thus afford a construction of greater cheapness than those in use hitherto. This is obtained by employing arches which intersect at a certain height, and are both continued beyond their lines of intersection without departing from their arched direction and curvature. These arches may be executed in any form desired, the essential point being that two intersecting arches should be continued beyond the line of intersection without a deviation from the regular course of the arch.

8,157.—WINDOW-SASHES: *W. J. Titheott.*—This specification relates to side sashes which have no facilities for using weights, and is intended to hang them without weights. The details of the invention can only be understood by reference to the drawings attached to the specification.

NEW APPLICATIONS FOR LETTERS PATENT.

July 4.—12,345, H. Cowell, Sash-fastener.—12,365, J. Hammersley and W. Fowler, Window-sashes.—12,374, A. Boult, Lock for Window-sashes.—12,393, A. Louis, Domestic Fireplaces.

July 5.—12,406. W. Spencer, Heating and Ventilating Cowls.—12,416, R. Fox, Waste Preventers or Flushing Cisterns.—12,425, H. Cutler, Folding Ladders.—12,443, J. von Langer and L. Cooper, Kilns for Burning or Baking Bricks, Porcelain, &c.—12,455, H. Tippett, Nails.

July 6.—12,471, W. Rockliffe and E. Jobling, Door-frames.—12,490, W. Smith, Fireproof Floors.—12,502, C. Parkin, Draught-excluder for Windows.—12,505, J. Bouillon, Tonguing, Grooving, Mortising, Tenoning, and otherwise shaping wood, and a Setting Instrument employed in connexion therewith.—12,509, J. Hull and Others, Weather-strips for Doors, Casements, Windows, &c.—12,512, J. Salkeld, Fireproof Floors, &c.

July 7.—12,539, H. Poole, Ventilating buildings or structures.—12,574, A. Gerber, Supporting doors, &c.

July 8.—12,583, J. Hayhurst, Spirit Levels.—12,601, A. Sharman, Brick for building purposes, &c.

July 9.—12,648, W. Munns, Water-closets.—12,650, W. Munns, Flushing Apparatus for Water-closets.—12,675, S. Owen, Non-corrosible Ball-float for Cistern-valves or Cocks.—12,678, J. Whittaker, Machines for making Compressed Bricks, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,180, J. Thompson and R. Pollock, Central Ejector or Injector Ventilators.—10,089, H. Dodd, Window Respirator and Draught Check.—10,532, M. Laffont, Material suitable for Building and Architectural purposes.—10,914, J. Riordan, Door Bells.—11,288, W. Richards, Improved System of Upholstery.—11,732, W. Neilson, Bolts for Doors, Windows, &c.—11,747, J. Dobbie, Fixing Tiles to Walls, Ceilings, and other places.—11,858, T. Downie, Window-sashes.

COMPLETE SPECIFICATIONS ACCEPTED.

(*Open to Opposition for Two Months.*)

14,918, J. Guy, Tiles and Bricks, and Machinery or Apparatus therefor.—15,509, G. Dolenz, Improved

Process for the Manufacture of Artificial Stone and Marble.—6,940, G. Hayes, Buildings, and Fireproofing same.—7,941, P. Gérard, Cutting Stone, and in Machinery and Accessories therefor.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

JULY 7.—By *P. D. Tuckett* (at Hammersmith): Thirty-six plots of f. land, Margravine-rd., Hammersmith, 2,266*l.* JULY 11.—By *S. A. Lock*: 97 and 93, Gore-rd., Hackney, u.t. 62 yrs., g.r. 14*l.*, r. 64*l.*, 645*l.*—By *G. A. Wilkinson & Son*: 113 to 119, odd, Heath-st., Hampstead, and 9, Golden-sq., f., r. 193*l.* 16s., 2,000*l.*; two enclosures of land, Friern Barnet-lane, 8a. 1r. 24p., f., 2,425*l.*—By *Messrs Waterer & Sons*: "The Hollies," and 4a., Addlestone, Surrey, f., 2,500*l.*—By *White & Sons*: "The Flushings" and 27a. 1r. 34 p., Great Bookham, Surrey, f., 1,650*l.*—By *Curtis & Sharp*: F.g.r. of 7*l.* 3s. 4d., Lion-st., Poplar, reversion in 50 yrs., 140*l.*; f.g.r. of 15*l.*, Kerby-st., reversion in 50 yrs., 305*l.*; 27, 29, and 36, Dora-st., Limehouse, u.t. 17 yrs., no g.r., 390*l.*; l.g.r of 15*l.*, Dora-st., u.t. 17 yrs., 210*l.*; l.g.r. of 19*l.* 10s., Endive-st., u.t. 17 yrs., g.r. 3*l.*, 210*l.*; l.g.r. of 20*l.*, Alice-pl., &c., u.t. 17 yrs., 300*l.*; l.g.r. of 7*l.*, u.t. 17 yrs., 70*l.*—By *Furber, Price, & Furber*: The lease of No. 9, Cheapside, u.t. 18 yrs, r. 450*l.*, 190*l.*; 199, Shirland-rd., Paddington, u.t. 71 yrs., g.r. 10*l.*, r. 57*l.*, 525*l.*; 53, 55, and 57, Marville-rd., Fulham, u.t. 90 yrs., g.r. 17*l.* 5s., 525*l.*; 1 and 3, Park-ter., St. Margaret's, u.t. 85 yrs., g.r. 22*l.*, r. 77*l.*, 630*l.*

JULY 12.—By *F. E. Eiloart*: No. 7, New-square, f. chambers, on ground-floor and basement, 1,750*l.*—By *A. Watson*: 64, Warwick-street, Pimlico, u.t. 41 yrs., g.r. 8*l.* 10s., r. 55*l.*, 490*l.*; 35, Edward-sq., Caledonian-rd., u.t. 48 yrs., g.r. 5*l.*, r. 30*l.*, 250*l.*; profit rental of 26*l.*, 18, Elder-st., Norton Folgate, u.t. 8 yrs., 100*l.*—By *Graves & Son*: An enclosure f. land, Stanwell, 4a. 0r. 1p., 160*l.*; 27, Kennett-rd., Paddington, u.t. 70 yrs., g.r. 7*l.*, 370*l.*—By *T. B. Westacott*: 7, Dale-rd., Kentish-town, u.t. 73 yrs., g.r. 6*l.*, r. 38*l.*, 330*l.*; 1, Victoria-rd., u.t. 46 yrs., g.r. 4*l.*, r. 28*l.*, 270*l.*; 4, Carrol-pl., Highgate-rd., c., r. 28*l.*, 330*l.*; 15, Sandwich-st., Burton-cres., u.t. 14 yrs., r. 8*l.* 8s., r. 40*l.*, 110*l.*—By *Wilkinson, Son, & Welch* at Brighton): 66 and 67, St. James's-st., Brighton, f., r. 72*l.*, 1,045*l.*

JULY 13.—By *A. Savill & Son*: "Elm's Farm," Matching-green, Essex, 82a. 3r. 2p., f., r. 100*l.*, 1,400*l.*; four freehold cottages, r. 16*l.* 14s., 125*l.*—By *Phillips & Dyer*: 24, 26, and 28, Hill-rd., St. John's Wood, f., 905*l.*—By *Deverell & Co.*: 28 and 30, Caversham-rd., Kentish-town, u.t. 57 yrs, g r. 24*l.*, 1,150*l.*—By *Gill & Son*: 104, Albert-rd., Kilburn, u t. 74 yrs., g.r. 6*l.*, 210*l.*; 23, Salusbury-rd., u t. 70 yrs, g.r. 7*l.* 10s., 330*l.*; 17, Park-lane, Regent's-pk., u.t. 8 yrs., g.r. 4*l.* 4s., 62*l.*—By *Baxter, Payne, & Lepper*: "Brierley Cottage," Laurel-grove, Penge, f., r. 44*l.*, 620*l.*—By *D. Young*: 9, Park-walk, Brixton, u.t. 89 yrs, g.r. 8*l.* 5s., r. 42*l.*, 330*l.*—By *Farebrother, Ellis, & Co.*: "The Fowley House Estate" of 554 acres, Liphook, Hants, f., 23,000*l.*; "The Heathcote Estates" of 1,925 acres, f., near Winchester, three enclosures of f. land, about 53 acres, 990*l.*; enclosures of f. land, about 45 acres, 1,000*l.*

JULY 14.—By *G. Pearce & Sons*: 21 to 45 odd, Ivy-lane, Hoxton; and 42 and 44, Ivy-st., u.t. 26 yrs, g r. 65*l.*, 1,050*l.*; 81 and 83, Parnell-rd., Old Ford, u.t. 62 yrs., g.r. 9*l.*, 340*l.*—By *Green & Son*: 47, Montserrat-rd., Putney, u.t. 86 yrs., g.r. 5*l.* 10s., 850*l.*; 61, Tufnell Pk-rd., Holloway, u.t. 72 yrs., g.r. 8*l.*, r. 45*l.*, 505*l.*—By *Blake & Dannatt*: 111, King George-st., Greenwich, f., r. 18*l.*, 290*l.*; 108, Manor-rd., Brockley, u.t. 73 yrs., g.r. 5*l.*, r. 45*l.*, 420*l.*—By *C. C. & T. Moore*: f.g.r. of 30*l.*, Balaam-st., Plaistow, reversion in 87 yrs., 700*l.*; 60 and 62, Shandy-st., Mile-end, f., 370*l.*; 1, Benledi-st., Poplar, u.t. 64 yrs., g.r. 3*l.*, r. 26*l.*, 215*l.*—By *Stimson & Sons*: 154, Camberwell-rd., Camberwell, f., 700*l.*; 43 and 45, Leipsic-rd., u.t. 13 yrs., g r. 7*l.* 4s., 230*l.*; 18 to 25, Camellia-st., Wandsworth, u.t. 40 yrs., g.r. 40*l.*, 1,110*l.*; 19, Philip-rd., Peckham, u.t. 58 yrs, g.r. 5*l.*, r. 28*l.*, 220*l.*; 54, Lawford-rd., Kentish Town, u.t. 66 yrs., g.r. 8*l.*, r. 40*l.*, 310*l.*; 9, Godolphin-road, Hammersmith, u.t. 61 yrs., g.r. 7*l.*, r. 38*l.*, 270*l.*—By *Newbon & Co.*: 37, Thornhill-sq., Islington, u t. 53 yrs., g.r. 7*l.*, r. 50*l.*, 475*l.*; 39, 40, and 41, Thornhill-sq., u t 53 yrs., g.r. 21*l.*, r. 150*l.*, 1,425*l.*; 1, 3, 5, 7, 13, and 15, Woodland-rd., Stoke Newington, u.t. 71 yrs., g.r. 30*l.*, r. 161*l.*, 1,360*l.*—By *D. Watney & Sons*: F.g.r. of 42*l.*, Upper Tulse Hill, reversion in 32 yrs., 4,200*l.*; f.g.r. of 24*l.*, Tulse Hill, ditto in 45 yrs., 720*l.*; f.g.r. of 49*l.* 10s., Upper Tulse Hill, ditto in 52 yrs., 1,400*l.*; f.g.r. of 12*l.*, ditto in 55 yrs., 400*l.*; f.g.r. of 14*l.*, ditto in 58 yrs., 490*l.*; f.g.r. of 36*l.*, ditto in 54 yrs., 1,080*l.*; f.g.r. of 46*l.* 4s., ditto in 82 yrs., 1,440*l.*; f.g.r. of 46*l.* 19s. 6d., ditto in 50 yrs., 1,610*l.*; f.g.r. of 12*l.* 12s., Tulse-hill, ditto in 49 yrs., 410*l.*: f.g.r. of 15*l.*, ditto in 72 yrs., 540*l.*; No. 71, "Stamore Lodge," f., r. 65*l.*, 675*l.*; 67a, "Warley Lodge," f., r. 87*l.* 10s., 1,100*l.*; 71, Upper Tulse-hill, f., r. 125*l.*, 2,050*l.*; "Tulse Hill House," 6a. 0r. 24p., f., r. 229*l.*, 6,050*l.*

JULY 15.—By *J. Carey & Co.*: Three plots of freehold land, Casewick rd., Norwood, 315*l.*—By *T. H. Wakefield*: 3 to 6, Clyde-ter., Forest Hill, u.t., 60 yrs., g r. 20*l.*, 370*l.*—By *Montagu & Robinson*: Freehold farm, 58a. 2r. 21p., Wickford, Essex, r. 60*l.*, 1,350*l.*; f.g.r. of 300*l.*, Addiehill, City of London, reversion in 71 yrs., 7,900*l.*; f.g.r. of 270*l.*, ditto 66 yrs., 6 850*l.*; f.g.r. of 370*l.*, Wardrobe-pl., ditto 66 yrs., 9 600*l.*—By *Broad & Wiltshire*: "Westfield" and 3a. 2r. 8p., Cudham, Kent, f., 350*l.*—By *Newbon & Co*: 164 and 168, Armagh-rd., Old Ford-rd., f., r. 52*l.*, 490*l.*; 161 and 163, Usher-rd., f., r. 52*l.*, 500*l.*; 148, Parnell-rd., f., r. 50*l.*, 750*l.*; 145 to 151 (odd), Usher-road, u.t. 52 yrs., g.r. 14*l.*, 650*l.*; 152 and 154, Armagh-rd., u.t. 52 yrs., g.r. 7*l.*, and a freehold mineral water manufactory, 505*l.*; 2, Vorley-rd., Holloway, u.t. 67 yrs., g.r. 7*l.*, 145*l.*; 144, Albany-st., Regent's-pk, u.t. 37 yrs., g r. 10*l.*, r. 70*l.*, 510*l.*—By *E. Wood*: "Rose Cottage," Eve-rd., Isleworth., f., 285*l.*

[*Contractions used in these lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g r. for ground-rent; r. for rent; f. for freehold; c. for copyhold: l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a for per annum; yrs. for years; st. for street; rd, for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	9/0/0 — 0 0 0
Teak, H.I...	load	9/10/0 — 15/0/0
Sequoia, U.S.ft.cu.		2/3 — 3/0
Ash, Canada	load	2/10/0 — 4/0/0
Birch, do.		3/5/0 — 4/10/0
Elm, do.		3/10/0 — 4/15/0
Fir, Dantsic, &c.		1/10/0 — 2/10/0
Oak, do.		3/0/0 — 5/5/0
Canada		5/10/0 — 7/0/0
Pine, Canada red		2/10/0 — 3/10/0
Do, yellow		2/10/0 — 5/0/0
Lath, D'ntsic, fath		5/0/0 — 6/0/0
St. Petersburg		5/0/0 — 7/0/0
Deals, Finland		
2nd & 1st std	100	7/10/0 — 9,10 0
Do, 4th & 3rd...		7/0/0 — 8/0/0
Do. Riga		6/10/0 — 8/0/0
St. Petersburg, 1st yellow		10/10/0 — 14/10/0
Do. 2nd yellow		8/0/0 — 9/10/0
Do. white		7/10/0 — 10/0/0
Swedish		7/0/0 — 15/10/0
White Sea		8/0/0 — 17/0/0
Canada, Pine 1st		20/0/0 — 26/0/0
Do. do. 2nd		14/10/0 — 18/0/0
Do. do. 3rd, &c.		8/0/0 — 10/0/0
Do. Spruce, 1st		8/10/0 — 11/0/0
Do. do. 3rd & 2nd		6/15/0 — 8/0/0
New Brunswick		7/0/0 — 7/10/0
Battens, all kinds		3/10/0 — 15/10/0
Flooring Boards, sq., 1 in. prep. 1st		0/8/0 — 0/13 6
Do. 2nd		0/7/0 — 0/10/6
Other qualities		0/3 6 — 0/8 0
Cedar, Cuba	ft.	/3½ — /4½
Honduras, &c.		/3½ — /4
Mahogany, Cuba.		/4½ — /6½
St. Domingo, cargo av		/4½ — 2/0
Mexican do. do		/4 — /5
Tobasco do. do		/5½ — /7
Honduras do..		/5½ — /6½
Box, Turkey	ton	4/0/0 — 13/0/0
Rose, Rio		10/0/0 — 20/0/0
Bahia		9/0/0 — 18/0/0
Satin, St. Domingo	ft.	0/0/3 — 0/1/3

TIMBER (*continued*).		
Satin, Porto Rico		0/0/8 — 0/1/6
Walnut, Italian..		0/0/3½ — 0/0/7
METALS.		
IRON—Pig, in Scotland	ton	2/1/3½ — 0.0.0
Bar, Welsh, in London		5/17/6 — 6/0/0
Do. do. at works in Wales		5/7/6 — 5/10/0
Do. Staffordshire, in London		6/5/0 — 6/15/0
COPPER—British, cake and ingot		47/10/0 — 48/0/0
Best selected		48/10/0 — 49/0/0
Sheets, strong		57/0/0 — 0/0/0
Chili, bars		44/12/6 — 45/0/0
YELLOW METAL	lb.	0/0/5½ — 0/0/5⅝
LEAD—Pig, Spanish	ton	10/10/0 — 10/11/3
English, com. brands		10/12/6 — 10/15/0
Sheet, English, 3 lbs. per sq. ft. and upwards		12/0/0 — 0/0/6
Pipe		12/10/0 — 0/0/0
ZINC—English sheet	ton	25/15/0 — 26/0/0
Vieille Montagne		26/5/0 — 0/0/0
TIN—Straits		98/0/0 — 98 5/0
Australian		98/0/0 — 98 5/0
English Ingots		101/0/0 — 101/10/0
OILS.		
Linseed	ton	18/10/0 — 18/12 6
Cocoanut, Cochin		24/15/0 — 25/0/0
Do. Ceylon		22/0/0 — 0/0/0
Palm, Lagos		22/5/0 — 22/10/0
Rapeseed, English pale		24/10/0 — 25/0/0
Do. brown		23/0/0 — 0/0/0
Cottonseed refd...		19/7/6 — 0/0/0
Oleine		21/10/0 — 22/10/0
Lubricating, U.S.		4/0/0 — 5/0/0
Do. refined		5/10/0 — 12/0/0
TAR—Stockholm	barrel	0/19/0 — 0/0/0
Archangel		0/12/6 — 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 12 *noon on Thursdays.*]

BIRMINGHAM.—Accepted for erecting four houses, at Northfield, near Birmingham, for Mr. Grant. Mr. Oliver Floyd, architect:—

M. H. Grant, Selly Oak £1,050 0 0

BIRMINGHAM.—Accepted for erecting eleven cottages, at Stirchley-street, near Birmingham, for Mr. A. R. Gibbs. Mr. Francis B. Andrews, architect:—

M. H. Grant, Selly Oak £2,269 0 0

BIRMINGHAM.—Accepted for erecting twenty-seven cottages, in the Elm Tree-road, Stirchley, near Birmingham, for Mr. Grant. Mr. Blenkarn, architect:—

M. H. Grant, Selly Oak..... £3,750 0 0

BROMLEY (Kent).—For works of kerbing, channel'ing, paving, &c., in Oaklands-road, for the Bromley Local Board. Mr. Hugh S. Cregeen, Surveyor:—

Hudson	£1,316 13 11	J. Mowlem & Co.....	1,175 0 0
T. Lansbury.....	1,294 19 6	Peill Bros. (accepted)	1,141 5 0

BUSHBY (Leicestershire).—For the erection of a residence for Mr. J. F. Kirby. Messrs. Miles & Beasley, architects, Leicester. Quantities by the architects:—

Thos. Bland & son ..	£3,470 0 0	Sharp & Neal	£3,172 8 0
S. & E. Bentley	3 419 3 11	T. & H. Herbert	3,165 0 0
Tyres & Yates	3,254 10 0	H. T. & W. Chambers	3,155 0 0
Hutchinson & Son ..	3,244 18 0	J. C. Kellett & Sons	3,090 0 0
Clark & Garrett	3,234 0 0	Geo. Brown	3,059 16 0
Mason & Sons	3,179 0 0	J. O. Jewsbury*	2,968 0 0

*Accepted. [All of Leicester.]

CARDIFF.—Accepted for the warming of St. James's Church, Cardiff. Mr. E. M. Vaughan-Bruce, architect:—

John Grundy..... £169

CLACTON-ON-SEA.—Accepted for the erection of residence in Carnarvon-road, for Mr. J. T. Williamson:—

Mark Potts £602 0 0

DYNAS POWIS.—For the erection of a shop for Mr. Geo. Hopkins. Mr. W. H. Dashwood Caple, architect, 1, St. John's-square, Cardiff. Quantities by the architect:—

Williams & Hoare....	£490 0 0	R. Jones	£388 12 8
J. Rowledge.....	446 6 0	Jenkins & Arnold	365 0 0
F. Small	405 11 0	W. Rees, Dynas Powis*	349 3 5

* Accepted.

EDMONTON.—For sundry repairs to and for repainting the outside of the workhouse at Edmonton, for the Guardians of the Strand Union. Mr. W. S. Cross, architect, Outer Temple, W.C. Quantities by Mr. Bernard Swinstead, surveyor, 22, Wellington-street, Strand:—

Harvey	£1,217!	W. Wright (accepted).....	£750
McLachlan & Son.....	930	W. Akers.....	600
Hall, Beddall, & Co....	890	Simms	589
Barrie Bros.	820	Lawrence	589
Dorrell & Co.	795	W. & E. Mill.....	589!

HASTINGS.—Accepted for alterations and improvements to banking premises, Hastings, for Lloyd's Bank, Limited. Mr. Arthur Wells, architect, Hastings:—

P. Jenkins, St. Leonards £3,400 0 0

HENLEY-ON-THAMES.—For alterations and additions to Highmoor Hall, Oxon, for Mr. G. T. Inman. Mr. Marshall Inman, architect, 7, Bedford-row, W.C.:—

J. Lovell	£1,783 0	E. Holley.....	£1,649 19
J. H. Johnson	1,746 0	Winter & Pitt	1,487 0

KINGSTON (South Devon).—Accepted for the restoration of Kingston Church, South Devon. (First contract.) Mr. Edmund Sedding, architect, Plymouth:—

Lukecraft..... £615 0 0

LITTLE COMMON (Sussex).—For rebuilding the "Wheatsheaf" Inn, at Little Common, for Messrs. Ballard & Co. Mr. Arthur Wells, architect, Hastings:—

T. Salter	£2,254 0 0	W. W. Parker	£2,063 7 7
Moon & Garner	2,250 0 0	P. Jenkins.....	1,995 0 0
Eldridge & Cruttenden	2,198 0 0	Padgham & Hutchinson	1,985 0 0
Chas. Thomas.....	2,170 17 6	H. E. Cruttenden ..	1,944 0 0

LONDON.—For providing and fixing heating apparatus on the low-pressure hot-water system (with the necessary boilers) for the following new schools and enlargement of a school, for the School Board for London. Mr. T. J. Bailey, Architect:—

New School, Kemsing-road, Greenwich.

D. O. Boyd.....	£857 0	J. Grundy	£390 0
Maguire & Son	476 0	Fraser & Son, Millwall Boiler Works*	394 10
Kinnell & Co.	436 0		
Wontner, Smith, & Co.	424 10		

New School, Choumert-road, East Lambeth.

Braithwaite & Son	£490 0	Wenham & Waters	£443 0
Maguire & Son	476 0	Purcell & Nobbs	396 0
Berry & Son	472 0	Fraser & Son*	393 15
W. G. Cannon	449 0		

Enlargement of School, Matthias-road, Finsbury.

Potter & Son	£514 0	Purcell & Nobbs	£446 0
R. Crane.....	500 0	J. & F. May	444 0
W. G. Cannon	488 0	G. Davis	436 0
Berry & Son.....	473 0	Fraser & Son*	433 10
Wenham & Waters.....	469 0		

* Recommended by the Works Committee for acceptance.

LONDON.—For the enlargement of the "Ashburnham" School by 356 places; also for providing new entrance for the boys' department, and for improving the existing drainage, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add.
D. Charteris	£4,035	..... £135 0
Foster & Dicksee.....	4,002	..... 74 0
S. & W. Pattinson.....	3,952	..... 110 0
Grover & Son	3,932	..... 120 0
Mowlem & Co.	3,835	..... 116 0
Shillitoe & Son	3 804	..... 160 0
H. Lovatt	3,582	..... 210 10
Longley & Co., Crawley*	3,542	..... 120 0

* Recommended by the Works Committee for acceptance.

LONDON.—For the enlargement of the Waldron-road School, Tooting, by 393 places; also for providing new water-closets for the boys' department; altering] the infants' water-closets, and for improving the existing drainage, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add.
Lathey Bros.....	£4,369 0	..... £120 0
W. Downs	4,310 0	..... 90 0
Holloway Bros.	4,223 10	..... 97 10
W. H. Gaze	4,045 0	..... 100 0
Holliday & Greenwood, Brixton* ..	3,951 0	..... 97 0

* Recommended by the Works Committee for acceptance.

LONDON.—For the enlargement of the infants' department of the Nunhead-passage school, Peckham-rye, by 140 places, and for other works, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add.
H. & H. F. Higgs.....	£7,540	..... £105
J. Smith & Sons	7 245	 100
Hart Bros.....	6,945	 128
J. Tyerman	6,673	 96
J. Marsland	6,285	 85
W. Downs	6,072	 111
Co-operative Builders, Lim., Brixton, S.W.* ..	5,318	 86

* Recommended by the Works Committee for acceptance.

LONDON.—For the enlargement of the Ackmar-road School, Parson's-green, by 400 places, and for carrying out other works, for the school Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add.
S. & W. Pattinson	£6,702	..... £120
Mowlem & Co.	6,471	 125
D. Charteris	6,404	 147
Foster & Dicksee	6 443	 73
J. Longley & Co.	6,269	 137
J. & M. Patrick, Rochester*	6,348	 62

* Recommended by the Works Committee for acceptance.

LONDON.—For enlarging the Langford-road School, Fulham, by 600 places, and for providing a new covered playground for the girls' and infants' departments, for the School Board for London. Mr. T. J. Bailey, Arcnitect:—

		If brickwork be built in cement, add.
Grover & Son.....	£7,732	..... £140
J. T. Chappell	7,665	 120
S. & W. Pattinson	7,648	 138
Killby & Gayford	7,627	 120
W. Downs	7,536	 142
Holliday & Greenwood	7,482	 118
Mowlem & Co.	7,375	 126
D. Charteris	6,518	 117
Foster & Dicksee, Rugby*..	6,479	 81

* Recommended by the Works Committee for acceptance.

LONDON.—For enlarging the Gravel-lane School, Houndsditch, by 712 places, and for carrying out other works, for the School Board for London. Mr. T. J. Bailey, Architect:—

		If brickwork be built in cement, add.
Mowlem & Co.....	£13,089	..... £261
T. Boyce	12,069	 150
Williams & Son	11,874	 149
D. Charteris	11,736	 253
Killby & Gayford	11,6.6	 168
*Grover & Son, New North-road, E.....	11,362	 126

* Recommended by the Works Committee for acceptance.

LONDON.—For providing a new system of drainage for the Atlay-road School, Old Ford, and for other works, for the School Board for London. Mr. T. J. Bailey, Architect:—

Norris & Luke.....	£1,044	Stimpson & Co.	£765
W. Gregar.....	874	J. N. Calnan & Co., 238,	
J. T. Robey	852	Commercial-road, E.*	583

*Recommended by the Works Committee for acceptance.

LONDON.—For re-laying the floors in the halls of both the boys' and girls' departments of the Bonne Grove School, Lavender-hill, for the School Board for London. Mr. T. J. Bailey, Architect:—

M. Marsland	£197 0	Whitehead & Co.	£105 0
J. Derry	164 0	H. Mallett, 233, Clapham-road, S.W.*	74 0
W. Hammond	148 10		
Garrett & Son	134 0		

* Recommended by the Works Committee for acceptance.

LONDON.—For providing new heating apparatus at the undermentioned schools, for the School Board for London. Mr. T. J. Bailey, Architect:—

Flint-street School, Walworth.

J. Wontner Smith, Gray, & Co.	£336	W. G. Cannon*	£329

Farncombe-street School, Bermondsey.

Wenham & Waters	£367	J. & F. May	£297
G. Davis	348	R. Crane	295
Berry & Sons	318	Clarke & Sons*	279
Purcell & Nobbs.....	317		

* Recommended by the Works Committee for acceptance.

LONDON.—For relaying the wood block floors of the three halls in the Sherbrooke-road School, Fulham, for the School Board for London. Mr. T. J. Bailey, Architect:—

Kent	£165 15	C. Humphreys, 11, High-street, Fulham*	£141 0
H. Smith & Sons	165 0		

* Recommended by the Works Committee for acceptance.

LONDON.—For painting, &c., at the infirmary, Mile-end, E. :—

Coote	£940 !	Coxhead	£520
Wood	778	Wales	499
Wall	678	C. N. Philips	499
Coleman	575	Crow	475
Martin	551	Judd	469 !

LONDON.—For building new waiting-rooms at the Whitechapel Baths :—

Cox	£543 0 0 !	White & Sons	£219 0 0
Coxhead	265 0 0	C. N. Philips	199 0 0
Harper	240 0 0	Kenney	181 8 8 !

LONDON.—For the erection of a block of chambers upon the site of 13, 14, 15, Pall Mall, S.W. Messrs. W. S. Joseph & Smithem, architects, 45, Finsbury-pavement. Quantities by Messrs. Franklin & Andrews.

Foundation work :—

C. H. & A. Bywaters	£1,040	J. T. Chappell	£960
W. Shepherd	1,030	Mark Patrick & Son*	838

*Accepted.

Superstructure :—

C. H. & A. Bywaters	£16,360	Colls & Sons	£15,487
W. Shepherd	16,128	Bush & Sons	15,449
Kirk & Randall	15,970	Hall, Beddall & Co	15,282
Lawrance & Sons	15,881	Ashby & Horner	15,282
Holland & Hannen	15,748	Mark Patrick & Son	14,970
Perry & Co.	15,600	J. T. Chappell*	14,896
Trollope & Sons	15,586		

*Accepted.

LONDON.—For new malting-house, &c., Canal-bank, Camberwell, S.E., for Messrs. Stanbridge & Co., Limited. Mr. Marshall Inman, architect, 7, Bedford-row, W.C. :—

Colls & Son	£3,860	Clarke & Bracey	£3,739
S & W. Pattinson	3,854	J. Simpson & Sons	3,678
Holloway Bros.	3,797	Wm. Downs	3,635
E. A. Roon	3,795	J. Grover & Son	3,567
M. Patrick & Son	3,740	J. H. Johnson	3,534

LONDON.—For alterations at 85 and 94, Chrisp-street, Poplar, for Mr. Palmer. Mr. Strevens, architect :—

Blake	£628	Walker Bros.	£459
Chas. A. King	610		

LONDON.—For alterations and additions to No. 41, Upper-street, N., for Mr. Hunteman. Mr. E. J. Harrison, architect, 70 and 72, Chancery-lane, E.C. :—

Benton	£863	E. Houghton & Son	£758
Downs	857	Hayworth & Son	737
Ward & Lamble	847	Lilley & Lilley	697
Drew & Cadman	845		

LONDON.—For additions and alterations to 15, Dawson-place, Bayswater, W. Mr. F. A. Bruin, architect, Richmond, S.W. :—

D. Charteris	£1,485 0 0	Scharien & Co.	£1,354 0 0
J. Tinson & Sons	1,478 13 9	Trail & Son (accepted)	1,281 0 0
Holloway Bros.	1,421 0 0	Simpson & Son (too	
E. Wilkinson	1,410 0 0	late).	

LONDON.—For rebuilding No. 542 Holloway-road, with addition in rear, for Mr. A. Monk. Mr. George Carter, architect, 513, Holloway-road :—

	House.	Addition.
Austin	£2,540	£610
Goodman	2 516	—
Howe	2,352	715
Hughes	2,005	654
R D. Lown & Sons	1,789	650
Steven Bros.	1,769	546
Luke Morris	1,744	531
Parker	1,720	400
Alston	1,400	400

LONDON.—Accepted for alterations to shop premises, in Stroud Green-road, N., for Mr. H. Pickard. Mr. R. Midworth, architect :—
N. Lidstone £497 0 0

NEWMARKET.—For erecting new racing establishment at Exning, near Newmarket, for Captain E. W. Baird. Mr. Jno. Flatman, architect, Newmarket :—

Kerridge & Shaw	£6,877	Simpson & Son	£6,500
Hunt & Blyth	6,550	Linzell (accepted)	6,180

NEWMARKET.—For erecting new cottages at Newmarket, for Mrs. Gilbert. Mr. Jno. Flatman, architect, Newmarket :—

Hook & Tebbitt	£2,299	Linzell	£1,669
Cowell	1,800	Kerridge & Shaw*	1,593
King	1,785	Hunt & Blyth	1,550
Simpson & Son	1,750		

*Accepted.

NEWPORT (Mon).—For the erection of grain warehouse, Riverside, Newport, Mon., for Messrs. Parnall, Evans, & Co., Limited. Mr. W. H. Watling, architect, Council Chambers, Newport, Mon., and Cardiff. Quantities by Mr. J. D. Whitaker, Newport, Mon. :—

Wm. Price	£2,490	Edwin Richards	£2,195
Charles Lock	2,460	Jonah Francis & Son, Newport (accepted)	1,938
John Linton	2,287		

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	Roof.	Columns and Girders.	Total.
Baker & Co.	£576	£300	£876
St. Pancras Iron Company	—	—	840
Isca Foundry	500	237	737
Finch & Co.	463	212	675
Rowbotham, Drew, & Co.	482	192	672
Mortou & Co.	379	258	637
Hy. Parfitt, Ebbw Vale (accepted)	373	225	598

PONTESBURY (Shropshire).—For building police station, Pontesbury, for the Shropshire County Council. Mr. A. T. Davis, C.E., County Surveyor. Quantities supplied :—

Everall & Sons	£1,906 0 0	T. Chaloner	£1,496 7 0
W. Reynolds	1,674 0 0	T. Higley	1,487 15 0
H. Price	1,651 15 0	G. H. Bickerton	1,465 14 9
R. Price	1,627 0 0	J. Gethin	1,447 4 5
W. Swain	1,615 10 0	T. Morris	1,410 0 0
T. France	1,560 0 0		

PONTYPRIDD.—For the erection of a house at Cilfynydd, for Mr. Arthur O. Evans, architect, Pontypridd. No quantities :—

M. Williams	£1,295 0	Evan Williams	£998 10
Ed. Owen & Co.	925 0	John Williams	£860 0

[All of Pontypridd.]

RASTRICK.—For sewering, paving, &c., of Bramston-street, for the Local Board. Mr. Chas. E. Shackleton, Surveyor. Quantities by Messrs. G. & G. H. Crowther, New-street, Huddersfield :—

Joseph Speight	£1,691 11 2	Slinger & Naylor	1,419 19 6
Thos. B. Dyson	1,658 14 3	James Wells, Hipperholme*	1,345 10 10
Frank Crowther	1,652 0 0		
Sam Hall	1,647 1 3	John Pickthall & Sons†	1,253 11 9
David Barry	1,603 18 2		
Alfred Yates	1,525 0 0		

*Accepted. †Withdrawn.

ST. LEONARDS-ON-SEA.—For alterations and improvements to banking premises, St. Leonards, for Lloyd's Bank, Limited. Mr. Arthur Wells, architect, Hastings :—

T. Salter	£965 17 6	Chas. Hughes, St. Leonards*	£755 0 0
P. Jenkins	898 0 0		
H. Cruttenden	886 0 0		

*Accepted.

TOTTENHAM.—Accepted for the construction of a 2 ft. 6 in. by 1 ft. 8 in. brick sewer in St. Anne's-road, Tottenham, for the Local Board of Health. Mr. J. E. Worth, C.E., Engineer :—
Bradshaw & Co., 52, Queen Victoria-street, E.C. £2,004 18 0
[Engineer's estimate, £2,000.]

WHITCHURCH (Salop).—For the erection of six shops at Whitchurch, Salop, for the Misses Kent. Mr. Reginald A. Rix, architect, 11, Dowgate-hill, London, E.C. :—

Smith & Sons	£4,450	Dodd	£3,010
Powell	3,067		

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Alfreton Ironworks,
July 15th, 1892.

ASSISTANT WANTED in an Architect's Office in the country. He must write a good hand, be able to keep accounts, and have some knowledge of draughtsmanship.—Applications in writing, stating salary required, to be addressed to Mr. FRED. CHANCELLOR, 20, Finsbury-circus, London, E.C.

WANTED (Temporary), in a Civil Engineer's Office, Westminster, a first-class DRAUGHTSMAN, experienced in main sewerage details. Also a GENERAL ASSISTANT, accustomed to specification drafting for like works from finished plans and full instructions. Also a JUNIOR, a neat tracer and printer. Age, reference, and salary.—Box 250, Office of "The Builder."

QUANTITY TAKER WANTED in a West-end Builder and Contractor's Office, to take off quantities for ordering materials, make working details, &c. Must be a thoroughly practical man.—Apply by letter, stating age, experience, references, and salary required, to Box 253, Office of "The Builder."

A FIRM of Manufacturing Sanitary Engineers have a VACANCY in their London Office for an energetic YOUNG MAN, who must have served some time in similar work.—Box 254, Office of "The Builder."

TO BUILDERS and GLASS MERCHANTS.—WANTED, AGENTS for the London and General Plate Glass Insurance Company, which has been established over thirty years.

Liberal commission and bonuses on new Insurances.—Apply MANAGING DIRECTOR, 46, Leicester-square, London.

TRAVELLER WANTED, used to Plumbers', Brass, and Steam Work, with good connexion, for London and suburbs.—By letter to the LAMBETH BRASS & IRON CO. LTD. Short-street Lambeth, S.E.

WANTED, for a Country Estate, a good practical CLERK of WORKS, thoroughly conversant with his business, and accustomed to estate work. Aged 30 to 40. Salary 100*l*. a year, and house, firing, and garden, and horse kept. No replies except to likely applicants.—Address, C. G. BOLAM, Boughton Estate Office, Kettering.

BUILDER and DECORATOR'S CLERK WANTED by West-end firm. Must be good at prime cost, jobbing accounts, and in keeping ledgers.—Full particulars of qualifications, age, and salary required, to Box 261, Office of "The Builder."

CLERK WANTED, in Office of country builder and decorator. Must be used to booking and pricing jobbing work, ledger, prime, cost, and general routine. Abstainer preferred.—State age, salary required, and full particulars, to Box No. 262, Office of "The Builder."

BUILDER'S CLERK, TIMEKEEPER, &c. WANTED, for a West-end jobbing business. Must be thoroughly up to the work. Quick and energetic.—Address, Box 265, Office of "The Builder."

CONTRACTOR'S TIMEKEEPER and CLERK WANTED for Job in Cambridge. Workmen's hours.—State age, salary, and where last engaged, in own writing—E. F. BALLING, 39, Shakespeare-street, Nottingham.

JUNIOR CLERK WANTED. Must be early riser, with knowledge of shorthand preferred.—Apply by letter, stating age and wages required, and where last employed, to E. TRIGGS, The Chase, Clapham, S.W.

YOUTH WANTED in Builder's Office, West-end, aged about 17. Must write good hand and accurate at figures.—Apply, stating salary required, &c. to Box 264, Office of "The Builder."

GENERAL WORKING FOREMAN WANTED, accustomed to public-house work. Carpenter and joiner. Must be thoroughly practical and reliable. — Reply, stating wages required, also references, to Box 260, Office of "The Builder."

SHOP FOREMAN (Practical) WANTED, for manufacturing Joinery and Horticultural Work. Must be energetic and good time keeper, and thoroughly experienced with both bench and machinery.—Address, with references and salary, Box 258, Office of "The Builder."

PAINTERS and DECORATORS.—WANTED, a WORKING FOREMAN, accustomed both to plain rough work and high-class decorative painting. Must be well up in his business, steady, active, a good colourist, liner, stenciller, and gilder, and accustomed to carry out a large job and manage a considerable number of men. — Address, stating age, experience, where employed in London, and wages, to DECORATOR, Box 257, Office of "The Builder."

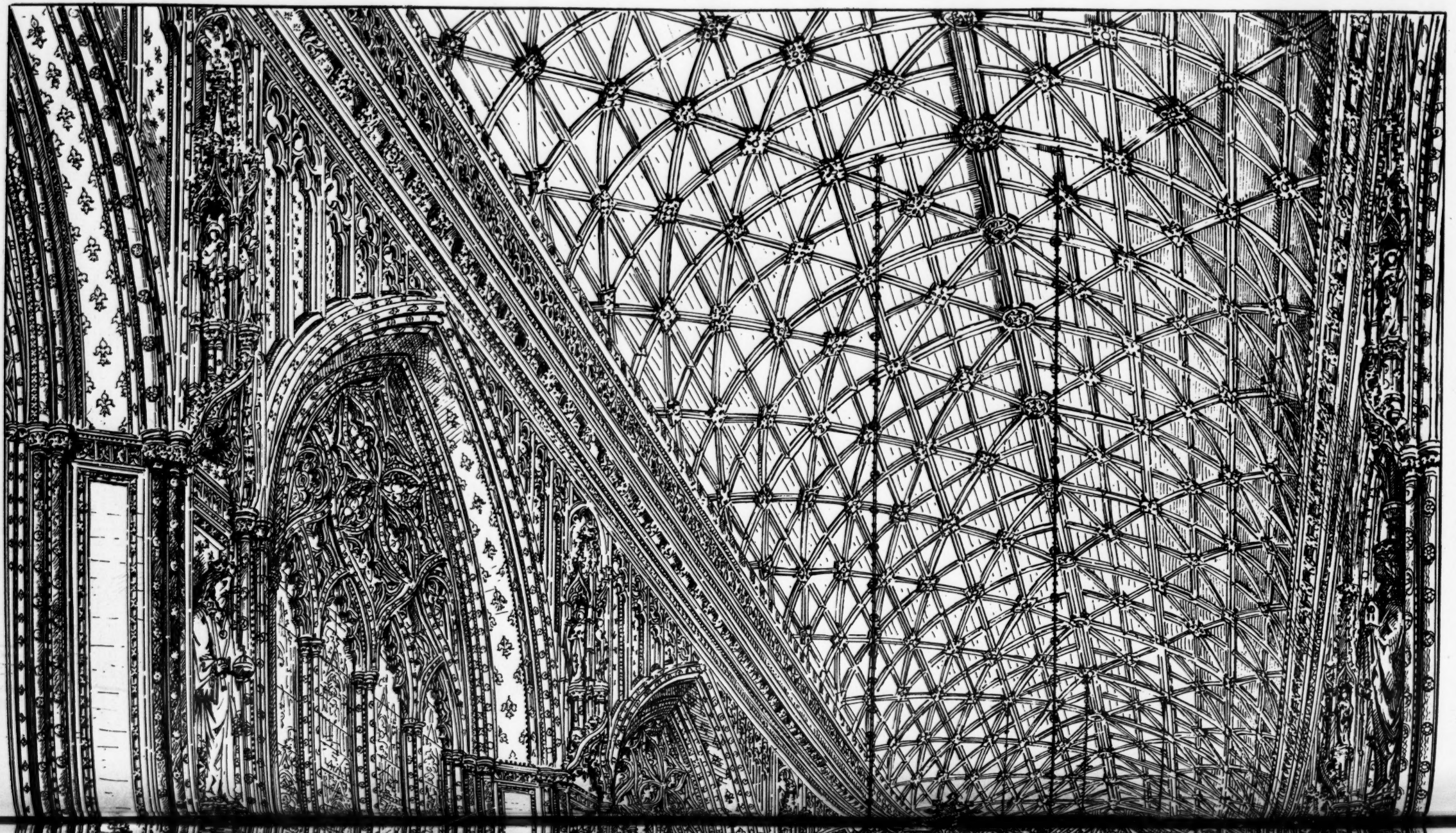
WORKING FOREMAN of PAINTERS WANTED, for first class West end trade. A competent man to charge of men. Good colourist.—Write to E. 14, Balcombe-street, Dorset-square, N.W.

WORKING FOREMAN of BRICKLAYERS WANTED, for a brick viaduct in the country. Must understand drawings, have had experience in similar works, and the other branches of the building trade.—Address stating age, references, and wages required, to Box 259, Office of "The Builder."

WANTED, a competent STAIRCASE HAND, one who can also set out joinery ready for machinery.—Apply, W. H. LORDEN & SON, 111, Trinity-road, Upper Tooting, S.W.

TO PAINTERS. — WANTED, a Good COLOURIST and WRITER. One accustomed to stencil work and writing preferred, to fill up time at plain painting. A constancy to a suitable man. Wages 8d. per hour.—Apply with reference &c. to THOS. H. BROWN, Contractor and Decorator, Cotham-road, Bristol.

STONE MASONS (Good) WANTED. 8½d. per hour.—Apply, Soham House, Newmarket, Cambs.



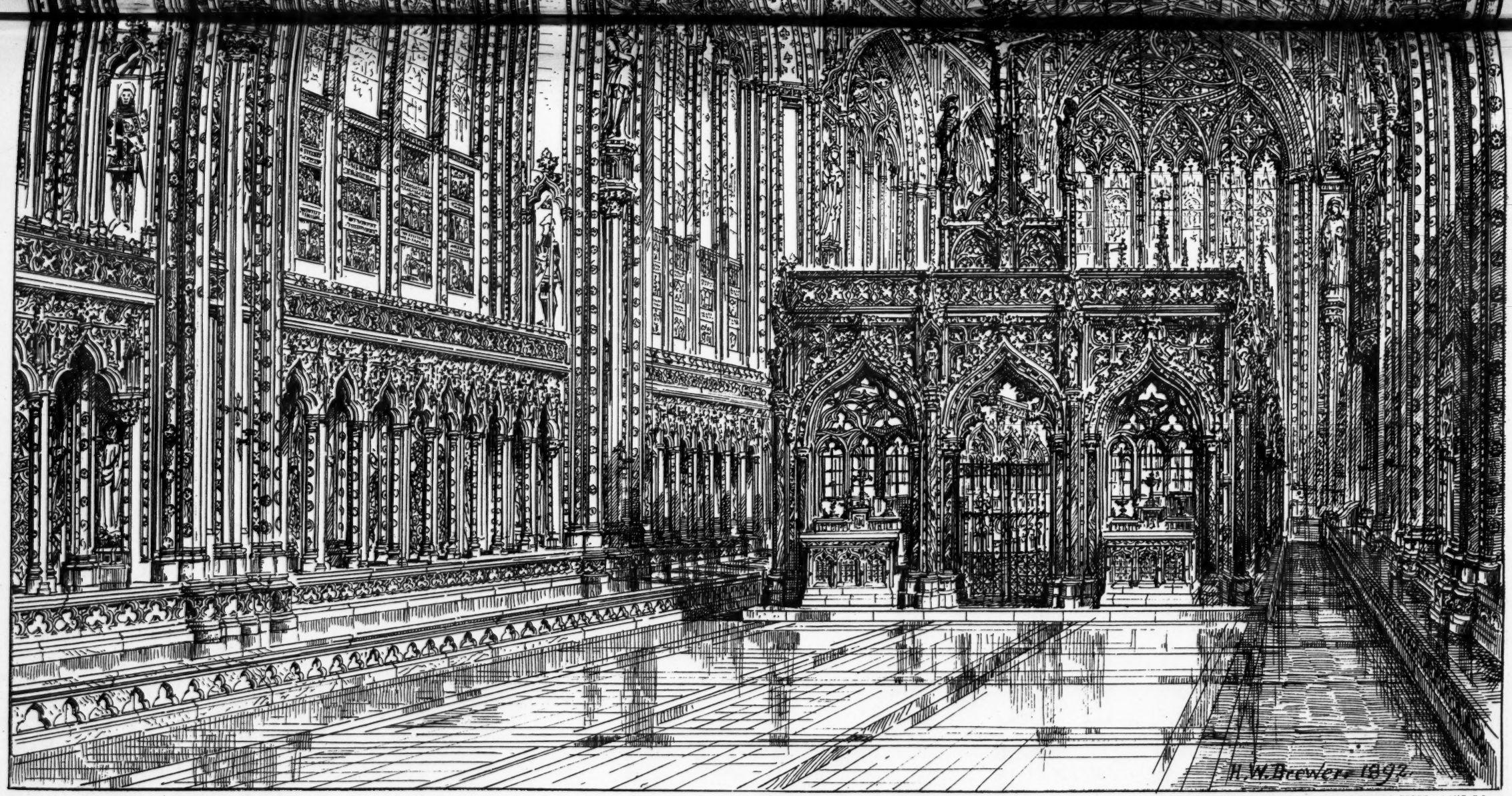


PHOTO-LITHO. SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

INTERIOR OF ST. STEPHEN'S CHAPEL, WESTMINSTER.—Restored, from Ancient Authorities, by Mr. H. W. Brewer.

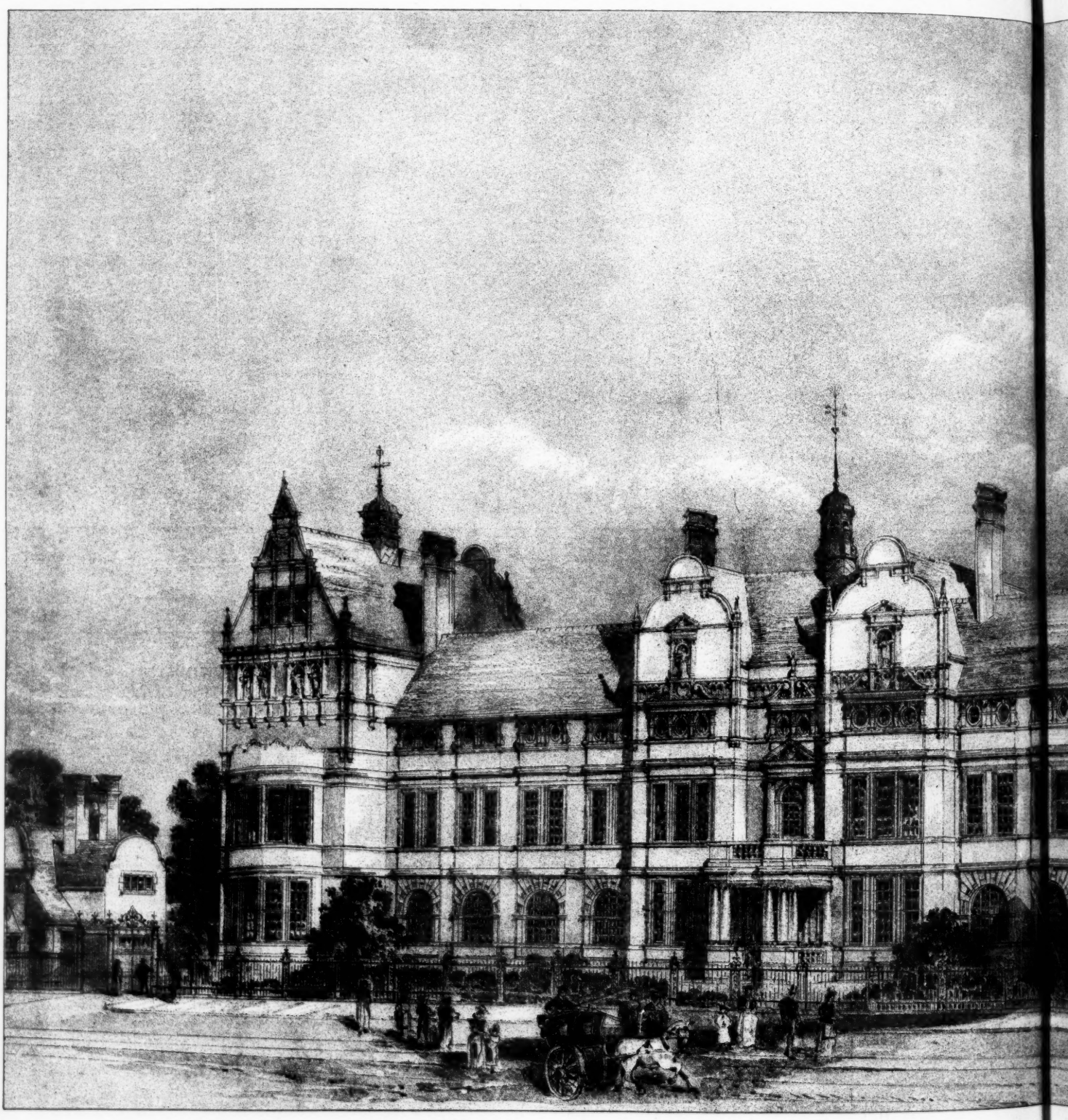
(For description, see article on "The Building and Decoration of a Royal Chapel.")

TROSLEY TOWERS KENT
the Seat of SIR SIDNEY WATERLOW BART

INTERIOR OF GRAND HALL.

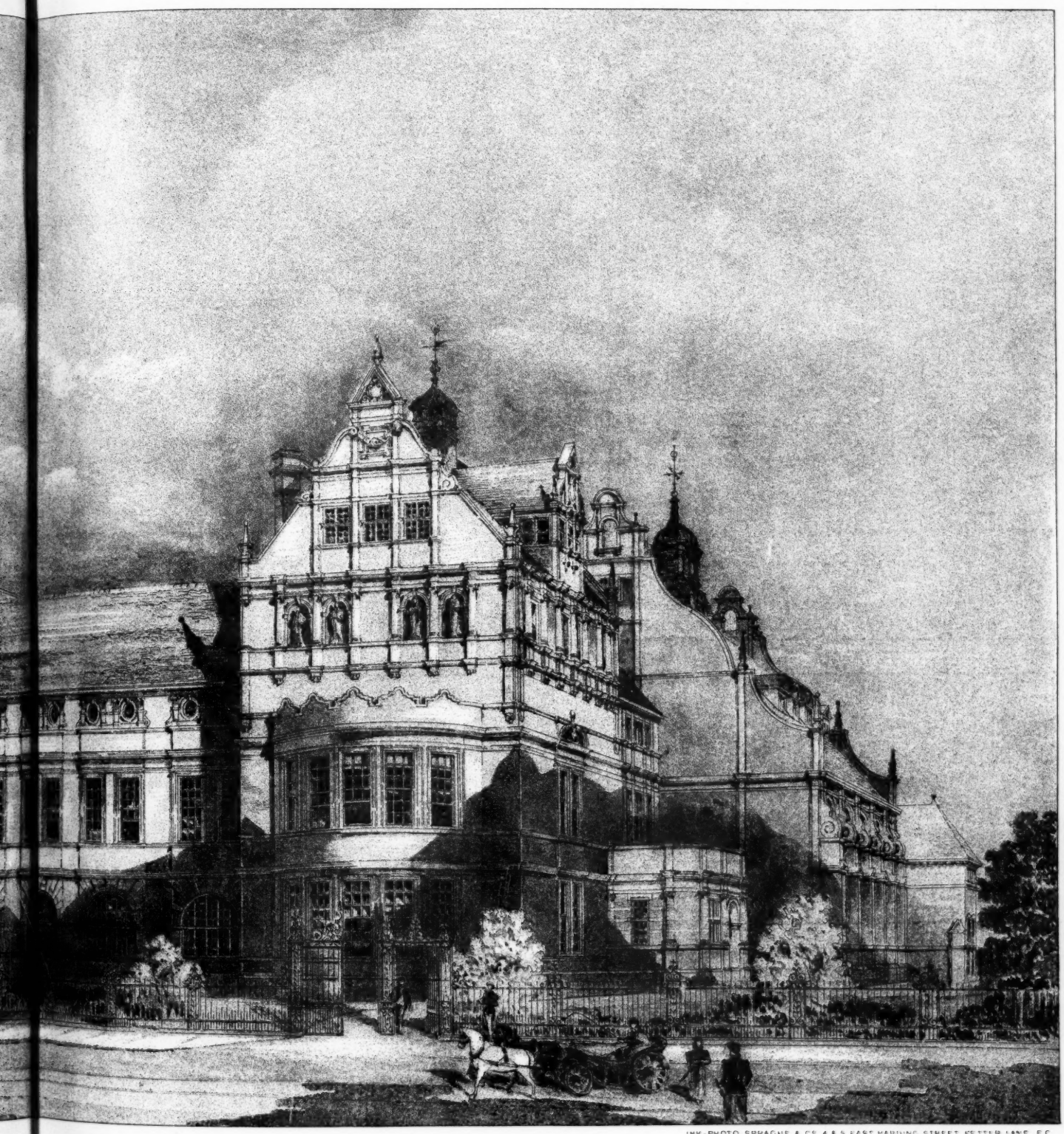
EDWARD R. ROBSON F.S.A. ARCHITECT
Palace Chambers Bridge St. Westminster

PHOTO-LITHO. SPRAGUE & Co 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.



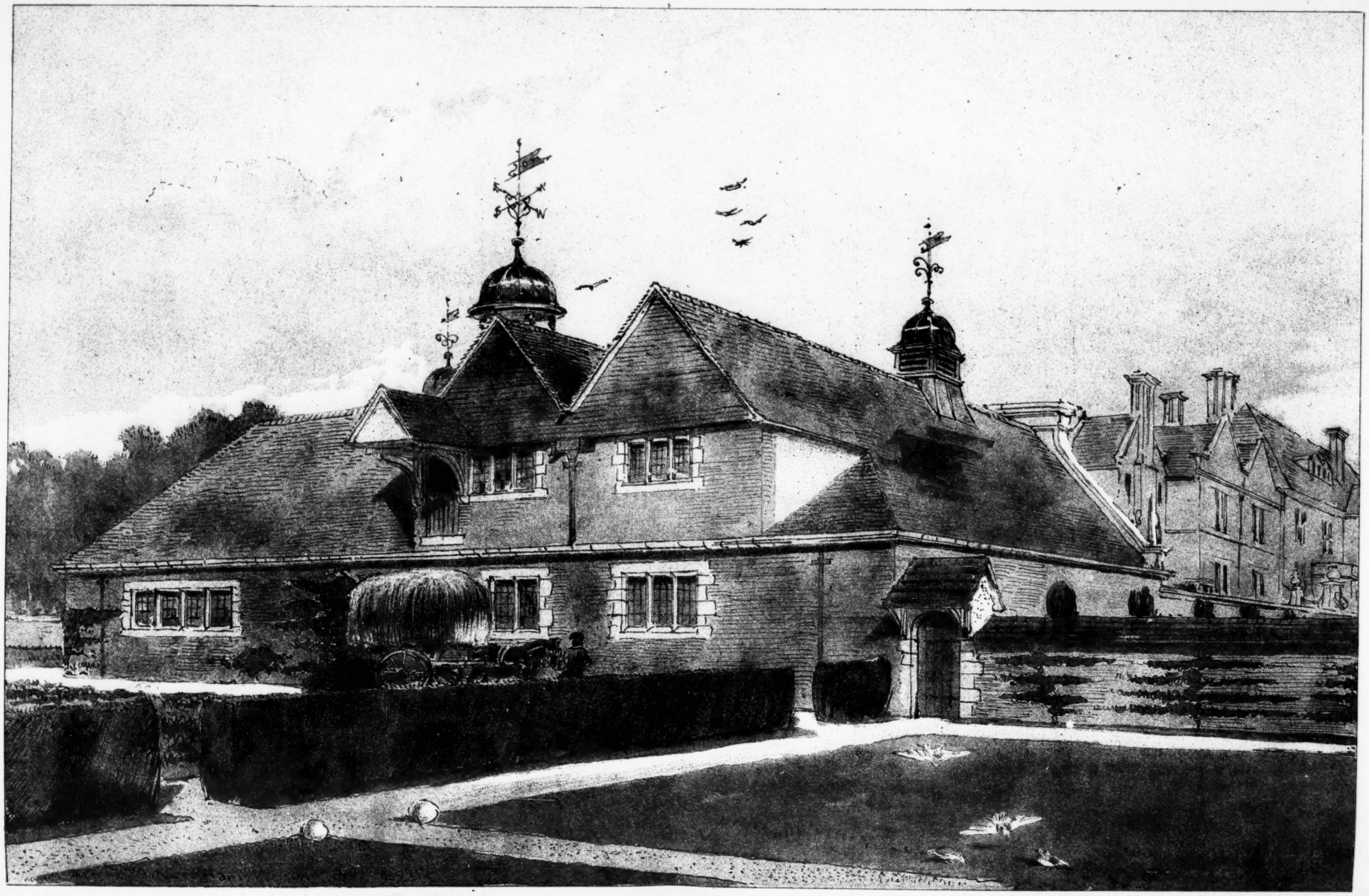
BATTERSEA POLYTECHNIC INSTITUTE—R. I

Royal Academy Exhibition, 1892.



INK-PHOTO. SPRAGUE & Co. 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

UTE.—R. E. W. MOUNTFORD, F.R.I.B.A., ARCHITECT



STABLES: PEWSHAM, WILTS.—Mr. C. E. Ponting, Architect.

Royal Academy Exhibition, 1892.

THE BUILDER, JULY 23, 1892.

Royal Academy Exhibition, 1892.

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